THE

NAUTILUS

A QUARTERLY JOURNAL
DEVOTED TO THE INTERESTS
OF CONCHOLOGISTS

VOL. XXXII

JULY, 1918, to APRIL, 1919

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SNOWBANKS IN AUGUST—GODDARD PASS, SIERRA NEVADA.
NINETY ABOVE IN JANUARY—TWIN CACTI CAMP, ARIZONA.

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NOTES ON THE GENUS TRACHYDERMON CARPENTER.

BY WILLIAM HEALEY DALL.

Iredale has already called attention to the two names for Chitons by Gray in 1821. A little fuller discussion of the consequences of the adoption of Gray's name *Lepidochitona* seems desirable to make the situation perfectly clear. The synonymy which is pertinent is as follows:

Lepidochitona Gray, London Medical Rep., XV, p. 234, 1821. *Chiton marginatus* (Pennant, = *cinereus* L., not of Montagu).

Stenosemus Middendorff, Malac. Ross. 1, pp. 103, 109, 117, 122, 1848; (1st sp. *C. marmoreus* Fabr.).

Ischnochiton sect.††, Gray, Guide Moll., p. 182, 1857 (*Chiton marginatus*).

Trachydermon Carpenter, Suppl. Rep. Br. Assoc., 1864, p. 612 (*Chiton dentiens* Gould); ibid., p. 649: Bull. Essex Inst., p. 153, 1873 (*Chiton ruber* (L.) Lowe, not of Spengler).

Craspedochiton G. O. Sars, Moll. Reg. Arct. Norv., p. 114, 1878 (*Chiton marginatus* Pennant, = *cinereus* L., not of Montagu).

Leptochitona Pilsbry, Man. XIV, p. 150, 1892 (err. typ.).

Section *Tonicella* Carpenter.

Platysemus Middendorff, (part) Mal. Ross. 1, p. 98, 1848 (*C. submarmoreus* Midd.).

Tonicella Carpenter, Bull. Essex Inst. V, p. 154, 1873 (*Chiton marmoreus* Fabricius).

Boreochiton G. O. Sars, Moll. Reg. Arct. Norv., p. 116, 1878 (*Chiton ruber* L., and *C. marmoreus* Fabricius).

Toniciella Thiele, Gebiss d. Schnecken, II, p. 389, 1891 (*T. marmorea* Fabr.).

Section *Cyanoplax* Pilsbry.

Cyanoplax Pilsbry, Man. XIV, pp. 40, 44, 1892 (*Chiton hartwegii* Carpenter).

Subgenus *Spongioradsia* Pilsbry.

Spongioradsia Pilsbry, Man. XV, p. 65, 1894 (*Trachyradsia aleutica* Dall).

In view of the similarity of names the following synonymy may be useful:

Genus Lepidopleurus Risso.

Lepidopleurus (Leach Ms.) Risso. Hist. Nat. Eur. Mérid. IV, p. 267, 1826 (1st sp. *L. cayetanus* (Poli) Risso); G. O. Sars, Moll. Reg. Arct. Norv., p. 110, 1878.

Section *Leptochiton* Gray.

Leptochiton Gray, P. Z. S., 1847, p. 127 (*Chiton cinereus* Montagu (not Linné) = *C. asellus* Spengler); Carpenter, Suppl. Rep. Brit. Assoc., pp. 530, 612, 650, 1864 (1st sp. mentioned as a real member of the genus is *Leptochiton nexus* Carpenter).

? *Lepidochiton* Carpenter, Rep. Brit. Assoc., pp. 317, 349, 1857 (1st sp. *C. lividus* Midd.). Includes also *C. mertensii* Midd., *C. scrobiculatus* Midd., and *C. proprius* Reeve; the latter = *C. dispar* Cpr., not Sowerby.

I confess to an inability to get anything like systematic order out of Middendorff's extraordinary tangle of names, except where some subsequent author has fixed a species as type, as in the case of *Symmetrogephyrus* (Midd., Feb. 1848), which Chenu (Man., p. 383) has declared to be typified by

Chiton pallasii Middendorff, thus displacing the more familiar *Amicula* (auct. not Gray, 1847) for that group.

Lepidochitona Gray, supersedes *Trachydermon* as indicated by Iredale (Proc. Mal. Soc. London, XI, p. 127, 1914). With the first mention of the latter genus Carpenter associates only two species, *C. pseudodentiens* Cpr. (= *dentiens* Gould) and an undescribed *C. gothicus*. The former must therefore be taken as type, instead of *flectens*, though they are really congeneric. As type of *Lepidochiton* Carpenter, I select his first species, *C. lividus* Midd., which is an *Ischnochiton*, but Carpenter apparently regarded it as synonymous with *Leptochiton*, to which he refers the species in his index of 1872. Pilsbry refers the species, in the order above cited, respectively to *Ischnochiton*, *Lepidozona*, *Ischnochiton*, and *Ischnoradsia*. The genus would best be considered a synonym of *Ischnochiton*, especially as no one seems to have quoted it after Carpenter, and he did not clear it up in his MS.

In regard to *Leptochiton*, I am inclined to agree with Berry that the west coast and Arctic forms are so different from the typical *Lepidopleurus cayetanus* that a sectional separation is appropriate.

CAMPING IN THE SIERRAS AND THE DESERT. PLATE I.

BY JAS. H. FERRISS.

Late in June of last year, facing westward I departed from the home snailery in search of adventure, and returned about the first of May this year.

At the Grand Canyon of the Colorado a couple of very warm days was devoted to the Bright Angel trail, digging vainly for *Sonorella betheli*.

The Vernal Falls, Yosemite Valley, California, offered another opportunity, with a yield of three Epiphragmophoras, one of these the *E. hillebrandi yosemitensis*, discovered there by Mr. Herbert N. Lowe. This was the opening of another season of delight in the California mountains. For nearly a

month we camped with the Sierra Club at the Tuolumne Meadows, making side trips from there in search of snails and other kinds of trout. Then eastward with our own pack train for more than another month over the high passes, with a side trip to Silver Lake, down into the branches of the San Joaquin, and over the John Muir Pass to the Middle Fork of the Kings River. At Tehipite valley we left the Middle Fork, westward crossed the North Fork, and hit the main river at Trimmer, where we left our mules and took the auto stage for Sanger and Fresno.

Out for health, and in no hurry, the opportunities for collecting were the best. The high altitudes, glaciers and snow banks were another world. In the valleys, with a wealth of flowers, birds, and trout, and the grandest scenery upon the continent, we rested several days at every camping place, as a rule. At Palisade creek we halted nearly a week and had golden trout for every meal.

But the snails were small, and few in number of specimens and species. Riding up the zigzag out of the Tehipite valley the silvery track of a snail was found on the trail, and in half a day I dug up a dozen Epiphragmophoras, looking like *E. traski*, the only large shell found since leaving the Yosemite. Like a Sonorella, they were living in a pile of rocks well covered with leaves and rotten wood.

Between trips we hunted up old friends and collections. Some of these were mail-order friends of long standing, and we were greatly pleased to see what they looked like. At Berkeley it was the Alaska bear skins, H. S. Swarth and Robert Grinnell. At Oakland, Fred L. Button, who gave us a two-night exhibition of his shells. At the Academy of Sciences, Golden Gate Park, Barton W. Evermann and the Henry Hemphill collection of western land shells. At the Leland Stanford University, Mr. and Mrs. Oldroyd and the Hemphill duplicates. At Los Angeles, the fossil bones from the asphalt beds. The collections and the collectors demonstrate the California spirit, and were far beyond our expectations.

Tucson likewise, Thornber, Cummins, Voorhies and Taylor at the University of Arizona, McDougal and Shreve at the

Carnegie Desert Laboratory are "live wires" in the natural sciences. Also explorers. Exploring begets good health, and good health begets enthusiasm. Also, Arizona is apparently the head center of natural history, so many species in botany and zoology have their beginning here. By the way, a newspaper reporter at Tucson gave us a reputation for the discovery of 650 new species of snails in Arizona! In figures it is well to give out type-written copy to the press. Then no embarrassing apologies to university clubs will be needful.

To eliminate a limp which interfered with snail-catching more and more, I went into a hospital at Tucson, and a month or two was taken out of this great vacation; but on the whole a large collection was made. With mules for the high desert ranges and a Ford for the smaller ones, one in the convalescent stage may make a good showing. Some of the hills are only 150 feet in height, and with a level desert floor we could almost collect from the machine. At one point it was not more than ten feet from snails to Ford. We seldom walked ten miles in one day, for with the larger mountains and their long and rough mesas we could ride within a half-mile of the snails.

Within the recent geologic period apparently there was a heavy rainfall (Noah's perhaps), so heavy that the large boulders were thrown out upon both sides of the channel, and thus these gulches are often heavily diked on the lower slopes of the mountain. These dikes are often the best collecting grounds, especially in dry weather; the fortifications of five or six feet in depth and twenty wide are easily explored. To catch a live snail at home in some of the larger slides higher up, a steam shovel and a full equipment of quarrymen is needed.

On horseback, with Frank Cole as guide, a trapper, hunter, prospector, forester, now a good snail-hunter and a wonderful cook, I made another trip through the Catalinas and Rincons, finding more of the rough-barked Sonorellas. Then into the Galuras, where we captured a smooth-bark *Sonorella* with a diameter of 32 millimeters. At Tucson my partner on the California trips and many others joined the party for a winter

in the desert. To her it seemed a dreary prospect, but a short trip into the Tucson range with its mesas forested with orchard-like trees and giant cactus, the ever-changing botanical societies, wild pigs, deer, mountain sheep, quail and very toothsome cottontails, told another story. The desert was as interesting as the mountains, and the weather in winter was summer-like without excessive heat or annoying insects. With extra tanks of gasoline upon our running-board, any place was home, the tent a parlor, and auto cushions a mattress. There was no lack of firewood or water.

The Tucson range, only an hour or so from the city, was particularly home-like. The first day in camp, Cole brought in a wild pig and baked it. With hot biscuit and steaming coffee, and the fruit and goodies brought from town, we had such a Christmas dinner, with surely as good an appetite, as in ye good old days, and it was on Christmas day. And, too, in a dining hall with columns and arches of living green, with prickers so long an unruly guest would not scratch the varnish. Our mistletoe decorations were generous, for there are eleven species and varieties in Arizona. Here we found our largest catch in Sonorellas, the rare fern *Cheilianthes pringleyi* and the most beautiful member of the fish-hook group of cactus, *Echinocactus lecontei.* From our camps westward towards the Silver Bell range, twenty miles away, it was a thick forest of the giant cactus, paloverde, mesquite and iron wood as far as the eye could see. Cole brought in a good pair of mountain sheep horns laid out by some lion or wolf about a year ago, and I dug up a nice diamond rattler the second day out. There are eleven species and varieties of rattlers in this state also.

We made seven camps on the west side of the range—Pictured Rocks, Rattler, Sheephorn, Wild Pig, Twin Cacti (Plate I), Cat Mountain and Limekiln. Sonorellas were found at 37 stations in five weeks. I worked about half time.

We also gave about the same amount of time to the ranges west, going as far as Ajo, and then I was in trim to work full time. These mountains west of the city of Tucson rise from a lower level than the Catalinas, Santa Ritas and the ranges

eastward. The higher peaks are supposed to run up to 8,000 feet above the sea. Very few are named, and so far as we could learn none have been surveyed. The Baboquivari system starts at the Mexican line and runs a little west of north. As the Baboquivaris, they are 40 miles in length, then known as Coyotes for 7 miles, as the Roskruge 20, as the Abbie Waterman 10, and as the Silver Bell 10 miles. We hit only a few high spots in the first three, and I collected at one small slide in the latter.

On the road to Ajo we had good success in Sonorellas in the small hills along the Comovo route, and here we first saw the organ cactus and the crucifix tree. Around the Ajo mountains—Wall's Wells and Montezuma Head—and the several nearby ranges, we were unable to find any traces of Sonorellas. The last Sonorella station west was at a small group of hills where the sign board of the Interior Department read "Tucson 101 miles". Beyond that the basalt rocks were covered with white dust that may have been alkali, or the granite had a face so sharp and dry the snails on a hike would require tennis shoes and a canteen. A mining prospector afterwards told us shells were to be found near the south end of the Big Ajo range where there was a small spring and walnut trees, and that they were also in the Mesquites, a range near the Mexican border. We anticipated a change in conditions, and perhaps Mexican or new groups of snails, and we still feel that something may be found in this field—perhaps in the Mesquite and border ranges, or in the Growlers, a forty-mile range west of Ajo—when the Mexican bandits are a little less active among the southern cattle ranges.

On the back track we returned by way of the Covered Wells and White Wells crossing the Quijota range, but found only a few Pupas, Succineas, and other small ones until we camped near some abandoned silver prospects in the southern end. We hunted the placer holes for rattlers without success but found a tiger rattler and Sonorellas in the rocks. We also had further luck in the foot-hills at the southern end of the Cababi range, where Mr. Cole had found Sonorellas in 1914.

Nearly all of this western half of Pima County is occupied

by the Papago Indians. Their horses, cattle, corn and wheat fields, and villages are numerous, and we were under many obligations to them for their good wells. Converted by the Catholic Fathers some three hundred years ago, and with the assistance of the Presbyterians since, they have become an industrious people, fat and very rich. Their housing is not pretentious, as with wealthy white men, but evidently sanitary, for the male in weight averages about 260 and his helpmeet about 180. The white men covet the Papago's grass and browsing, and would like a mix-up; but Uncle Sam at present is plainly giving the Indian a square deal.

Between the Tucson Range and the Ajo we collected at 55 stations, sampling the hills here and there. Other expeditions were made to the Serritas, to the Rosemont and Greaterville mining districts on the east side of the Santa Ritas, and to the Empire and Mustang Ranges on our way to visit old friends in the Huachucas. A. F. Berner, an old friend of the botanists and snail hunters, was found in hard luck. He is now blind and has been confined to his bed with rheumatism for two years. The entomologist, Biedermann, is more fortunate. He has been remarkably successful with beetles and moths, and he is now an acknowledged leader in grafting. With 99 per cent success he has made the Carr Canyon walnuts produce the best of European walnuts, and the Black Hamburgs are now picked from the wild vines of his homestead. He hopes to exhibit home-grown chestnuts in another year, from the mountain oaks. They do it in France. Happy Jack is a prosperous merchant on the Ocean-to-Ocean auto way.

In the Empire Range, draining into the Santa Cruz River, and the Mustangs, draining into the San Pedro, we found both *Holospira* and *Oreohelix* as well as *Sonorella*. Here was further evidence of ancient "Noah flood" mischief. Deep in the clay of the gulches of the Mustang slopes were Sonorellas and Oreohelix, not to be found alive, or mixed in with the species now living. I worked hard a day and a half to find them alive or freshly dead, but other peaks and gulches had only subfossils of their kind. A like condition existed along the Bright Angel trail in the Grand Canyon. Since my former

visit floods had cut the clay banks and turned up a subfossil species of *Oreohelix* not now found alive on the south rim.

Thus ends my longest adventure, and perhaps the most fruitful. Collections were made at 187 stations, and with something over 140 sets of duplicates thrown into the basket by generous California friends, we will have about 500 separate lots to check up and discuss later.

Joliet, Ill., June, 1918.

NEW VARIETIES OF NAIADES FROM LAKE ERIE.

BY N. M. GRIER.

While the general distinction between the Naiades of Lake Erie and their parent forms of the Ohio drainage have already been commented upon by Walker, (1) representatives in Lake Erie of at least three of the parental forms have never been given the varietal distinction they deserve. The parent species following the nomenclatorial changes proposed by Frierson (2) and Vanatta (3) are *Fusconaia flava* (Raf.), *Elliptio dilatatus* (Raf.), and *Symphynota* (*Lasmigona*) *costata* (Raf.). The comparisons between them and their Lake Erie representatives were made with the aid of Simpson's Descriptive Catalogue.

ELLIPTIO DILATATUS var. STERKII, new variety.

Differs from typical *dilatatus* by its smaller size, less elongated and proportionately higher shell. Always inflated, not so pointed posteriorly. Ventral line rather straight, beaks more anterior in position. Epidermis in *dilatatus* dark brown and horn or yellowish, surface usually with uneven growth lines. In *sterkii*, epidermis always smooth or polished, light olive green to yellowish brown to reddish brown. Nacre in *dilatatus* mostly dark purple, salmon and white; that of *sterkii* is lavender, light reddish purple, pearl-blue.

The following table gives maximum, minimum and mean dimensions of 52 shells each of parent and variety:

E. dilatatus			Var. *sterkii*		
Length	Height	Diameter	Length	Height	Diameter
130 mm.	60 mm.	35 mm.	87 mm.	46 mm.	28 mm.
86 mm.	41 mm.	24 mm.	59 mm.	31 mm.	18 mm.
30 mm.	16 mm.	7 mm.	26 mm.	13 mm.	7 mm.

Factors obtained from above by comparison of length with height and diameter show that greater height and inflation rest with *sterkii*—51% and 30% as against 48% and 25%. In variety *sterkii*, the average distance of the beaks from the anterior extremity of the shell is 18% of the total length; in *dilatatus* this is 25%. There appears to be no substantial difference between values obtained with Simpson's measurements and my own.

This new variety is respectfully dedicated to Dr. V. C. Sterki, who first commented upon the distinction between it and the stream forms. (4) Type no. 61. 4268, card catalogue Carnegie Museum.

LASMIGONA COSTATA var. EREGANENSIS, new variety.

Variety *eriganensis* is smaller, less elongated and proportionately lower than *costata*. Ventral line straight. Epidermis in *costata* light horn-color to dark chestnut in old specimens, surface usually with uneven growth lines. In *eriganensis* always smooth or polished, greenish olive to reddish brown to chocolate-brown, even growth lines. Nacre in *costata* cream-color to lavender or blue. In variety *eriganensis*, pinkish, buff or salmon-color.

Average for 20 shells:

costata			var. *eriganensis*		
Length	Height	Diameter	Length	Height	Diameter
137 mm.	78 mm.	42 mm.	90 mm.	46 mm.	31 mm.
96 mm.	55 mm.	27 mm.	72 mm.	40 mm.	23 mm.
55 mm.	31 mm.	14 mm.	65 mm.	36 mm.	19 mm.

Factors secured as previously show that *costata* is proportionately higher than var. *eriganensis*, 56% against 53%, but

is not so inflated 27% against 32%. My measurements of *costata* check readily with those of Simpson.

Type no. 61.4720, card catalogue, Carnegie Museum.

FUSCONAIA FLAVA var. PARVULA, new variety.

Variety *parvula* differs chiefly in size from *flava*, being smaller although proportionately higher and more inflated. Epidermis of *flava* yellowish to dark horn-color; in var. *parvula*, yellowish green, greenish olive. Surface with even growth lines. Nacre of typical *flava* mostly white, tinged with salmon in the beak; of *parvula*, pinkish-color or to pale blue.

Dimensions:

flava			var. *parvula*		
Length	Height	Diameter	Length	Height	Diameter
91 mm.	60 mm.	37 mm.	59 mm.	45 mm.	30 mm.
36 mm.	43 mm.	25 mm.	36 mm.	28 mm.	18 mm.
27 mm.	24 mm.	25 mm.	13 mm.	11 mm.	8 mm.

Ratio of length to height and diameter in *flava*—77% and 42%.

Ratio of length to height and diameter in var. *parvula*—79% and 51%.

Similar results are obtained from Simpson's measurements of *flava*.

Type no. 61.4513 card catalogue, Carnegie Museum.

The type specimens of the above three new varieties were collected by Dr. A. E. Ortmann at Big Bend, Presque Isle Bay, Lake Erie, July 8-12, 1910, and kindly entrusted to me for description. They appear to be generally distributed throughout Lake Erie.

1. Walker, Bryant. "Unione Fauna of the Great Lakes." Nautilus, 27, 1913.
2. Frierson, L. S. "Remarks on Classification of Unionidæ." Nautilus, 28, 1914.

3. Vanatta, E. S. "Rafinesque Type of Unio." Proc. Acad. Nat. Sciences, Philadelphia, 1916.
4. Sterki, V. "A Preliminary Catalogue of the Land and Freshwater Mollusca of Ohio." Proc. Ohio Acad. Science, IV, pt. 8.

A FURTHER NOTE ON THE GENUS TRACHYDERMON.

BY S. STILLMAN BERRY, REDLANDS, CALIFORNIA.

Since the publication of my note on the chiton genus *Trachydermon* in the Proceedings of the California Academy of Sciences, (4), vol. 7, p. 245, September, 1917, Mr. Tom Iredale has supplied me with the interesting information that *Trachydermon* Carpenter 1864 is preoccupied, and hence cannot be used in *Polyplacophora* in any sense. This considerably clarifies the whole situation by rendering needless any further investigation as to which species is properly to be regarded as the type of the genus. At the same time the peculiar group of West American chitons comprising the old *Trachydermon flectens* Carpenter and the remarkable *Mopalia heathii* of Pilsbry is automatically left without a name. Having ascertained from Mr. Iredale that he is chiefly concerned with certain other consequences of the nomenclatural tangle we have discussed and has, himself, no intention of taking up the present question, I feel at liberty to propose the new generic name, *Basiliochiton*, based upon *Mopalia heathii* Pilsbry 1898 as its typical representative. A cogent argument for the selection of this rather than the older species as the type of the genus is that the whereabouts, if not the very existence, of the type specimen of Carpenter's *flectens* appears to be unknown. I had supposed it to be in the British Museum, but Mr. Iredale writes me that it is not there. It is possible that it was destroyed along with so many other Carpenterian specimens in the San Francisco conflagration of 1906.

A further and fuller discussion of this group of chitons will appear in a forthcoming publication.

THE SYSTEMATIC POSITION OF TWO SPECIES OF MUSSELS FROM THE OZARKS.

BY DR. A. E. ORTMANN.

EURYNIA (MICROMYA) VENUSTA (Lea).

Lampsilis venusta Simpson, Synopsis, 1900, p. 543. — Descr. Catal., 1914, p. 89.

A large number of specimens has been received from L. S. Frierson, collected by A. A. Hinkley on July 30, 1914, in James River, at Galena, Stone Co., Mo.

Specimens of this lot have been sent to B. Walker, who also believes them to belong to *U. venustus* Lea, a species closely allied, on the one hand, to *L. ellipsiformis* (Conr.) (Simpson, 1914, p. 128), and, on the other hand, to *L. pleasi* (Marsh) (Simpson, p. 129). In fact, the latter is hardly anything else but a smaller and thinner *venusta*. I have no doubt that all three group together, and very likely the anatomy will be the same. Utterback (Amer. Midl. Natural, 4, 1916, p. 141) places *ellipsiformis* in the genus *Nephronaias*, but I do not think that this is correct, since he describes the *papillæ* on the mantle edge.

Call (Tr. Acad. St. Louis, 7, 1895, p. 57) believes that *pleasi* is identical with *venustus*, and, according to Frierson (in litt.), *venustus* is the same as *ellipsiformis*. Meek & Clark (Bur. Fisher, Doc. no. 759, 1912, p. 19) mention, from Big Buffalo Fork, *Lampsilis venusta*, which, according to their remarks, is this form.

Anatomy: Soft parts (3 ♂ ♂ and 3 sterile ♀ ♀ are at hand) of the usual *Eurynia*-structure. Anal and supraanal openings separated by a moderate mantle connection. Anal with distinct crenulations, branchial with papillæ. Posterior margins of palpi connected at base only. Inner lamina of inner gill entirely connected with abdominal sac.

Marsupium in posterior half of outer gill, with a rather larger non-marsupial section at posterior end. Ovisacs about 15 to 20. *Mantle margin*, in front of branchial, slightly lamellar, with small, irregular papillæ, which are not crowded.

and extend forward nearly to the middle of the lower margin, becoming quite distant and small in front.

Color of soft parts whitish, with black pigment around anal and branchial openings, and a brown or blackish streak running forward on mantle margin on the inside of the papillæ. Edge of marsupium with brown pigment.

This species undoubtedly belongs near the group, of which *E. vanuxemensis* may be regarded as the type. The anatomy is practically the same, and the papillæ on the mantle margin are very much alike. Also in the shell are certain common peculiarities, since *E. venusta* has, in the female, an indication of that peculiar "constriction" seen in the *vanuxemensis* group. Our species, however, differs in the more elongate shell, weak development of postbasal expansion of the female, which is located rather more anteriorly, thus suggesting, to a degree, the shape seen in *Medionidus plateolus* (= *conradi*), with which species *U. pleasi* has been compared by Marsh. My specimens have a strong tendency to become more or less intensely of a salmon-color in the nacre.

This seems to be a species characteristic for the Ozark region.

LAMPSILIS BREVICULA (Call).

L. brevicula and *L. brevicula brittsi* Simpson, 1900, p. 533.—1914, pp. 57, 58.

L. brittsi Simps. is an absolute synonym of *brevicula* Call: the differences mentioned by Simpson do not hold good at all. The emargination of the posterior basal margin of the female shell is not always present, probably only in old specimens [as in L. satura (Lea)]. Among my material there are no specimens which show it.

A number of individuals is at hand from James River, Galena, Stone Co., Mo., and from White River, at Cotter and Norfolk, Baxter Co., Ark. (L. S. Frierson donor). From Galena and Cotter I have specimens with soft parts, collected July 31 and August 2, 1914 (by A. A. Hinkley). Among them is a gravid female, caught in the act of discharging glochidia (July 31), so that this date indicates the end of the breeding season.

Anatomy of the *Lampsilis* type, and agreeing almost completely with that of *L. luteola* (see: Ann. Carn. Mus., 8, 1912, p. 348). The mantle flap is of the same shape as in this species, with the edge irregularly toothed, the largest teeth standing on the free, anteriorly projecting lobe, giving it a lacerated appearance. Also the color markings are the same (streak of black or brown pigment, and I think I can distinguish in some of my specimens an indistinct eye-spot).

Glochidia suboval, agreeing in shape and size with those of *L. luteola;* their L. is 0.23, their H. 0.28 mm. Surber has figured them [Rep. U. S. Comm. Fish. for 1914, App. 1915 (Fish. Doc. no. 313), pl. 1, f. 14]. His measurements are: 0.230 × 0.290, while Utterback (for var. *brittsi,* Am. Midl. Nat., 4, 1916, p. 173 gives: 0.250 × 0.305.

According to its anatomy, this species falls in the *luteola* group of *Lampsilis,* and represents a peculiar type of it, which seems to be restricted to the Ozark region, and may be regarded as having the same relation to *L. luteola* as has *L. fasciola* (= *multiradiata*) to *L. ventricosa.* (Smaller, thin-shelled form, with numerous fine, broken rays; the shell is, in the average, less elongated than that of *luteola*).

I do not understand why Utterback (l. c.) places this species in the genus *Eurynia,* since he describes very well the *flap* of the mantle margin.

NEW LANDSHELLS FROM THE PHILIPPINES.[1]

BY PAUL BARTSCH.

HEMIPLECTA SAGITTIFERA BATANENSIS, new subspecies.

Mr. Walter F. Webb, of Rochester, N. Y., has sent to the U. S. National Museum two *Hemiplectas* from the island of Batan, off northern Luzon, which belong to the *sagittifera* complex. This is a dark-colored race, which agrees fairly well in size with typical *sagittifera* from the Sinait region of Luzon, the type locality of *Hemiplecta sagittiffera,* but is considerably

[1] Published by permission of the Secretary of the Smithsonian Institution.

more depressed and of much darker coloration. The basal portion of the last whorl is also less inflated. The aperture is proportionately longer and more compressed. The type, Cat. No. 218765, U. S. N. M., has 4.4 whorls and measures: altitude, 23 mm.; greater diameter, 50.2 mm.; lesser diameter, 38.5 mm.

OBBA LISTERI BATANENSIS, new subspecies.

The *Obba* from the island of Batan, is also distinct from any of the other forms known from the Philippines, as shown by specimens received from Mr. Webb. It belongs to the *Obba listeri* complex. It is nearest related to *Obba listeri costata* Semper, from the island of Camigin, of the Babuyan Group, north of Luzon. It differs from this markedly by its more regularly conic outline, somewhat greater elevation, paler ground color, and rougher incremental sculpture. The type, Cat. No. 218764, U. S. N. M., has 4.4 whorls and measures: altitude, 10 mm.; greater diameter, 26.7 mm.; lesser diameter, 22.1 mm.

COCHLOSTYLA POLYCHROA BURIASENSIS, new subspecies.

Specimens of the *Cochlostyla polychroa* complex sent to the U. S. National Museum for determination have made it necessary to critically examine that group. This examination has revealed the fact that most of the specimens in collections passing under this name are from the island of Burias. The type locality for *Cochlostyla polychroa* is Temple Island, an island adjacent to Burias. A series of specimens from this island in the collection of the National Museum show that the shells of the typical form, that is *Cochlostyla polychroa polychroa*, are larger, decidedly more elevated and conic than the specimens from the island of Burias. The coloration, too, is much more vivid in the Burias shells than those from Temple Island. I shall therefore bestow the name *Cochlostyla polychroa buriasensis* upon the shells from Burias Island.

The type of this shell, Cat. No. 218788, U. S. N. M., has 4.7 whorls and measures: altitude, 35 mm.; greater diameter, 30.7 mm.

NOTES ON THE GLOCHIDIA OF STROPHITUS EDENTULUS PAVONIUS (LEA) FROM COLORADO.

BY M. M. ELLIS AND MARIE KEIM.

While collecting material for class use from St. Vrain Creek, near Longmont, Colorado, December 6, 1817, 25 specimens of *Strophitus edentulus pavonius* (Lea) (det. J. Henderson) were obtained. Of these, 15 contained large numbers of well-developed glochidia. These glochidia soon freed themselves from the cords when the cords were placed in water after being removed from the gills of the parent mussels, and each individual glochidium began active snapping movements. Many individuals lived for two or three days after leaving the cords and continued active all the while.

This record of gravid specimens of *Strophitus edentulus pavonius* is later in the year than any record given by Surber (Bur. Fish. Doc. 771, 1912) for *Strophitus edentulus* from the Mississippi River, November being the last month in which he found glochidia-bearing individuals of that species.

When compared with the figures and description given by Surber (l. c.) for *Strophitus edentulus*, the glochidia of these Colorado mussels of the variety *pavonius* were found to differ in both size and proportion from the *Strophitus edentulus* type. As these differences may have some taxonomic significance, occurring as they do in the glochidia of a variety of *Strophitus edentulus* taken near the western edge of the range of that variety, the following description of the glochidium of *Strophitus edentulus pavonium* is given.

General shape that of the *Anodonta* type as given by Surber (l. c.) but of a form intermediate between that of *Strophitus edentulus* (fig. 3, l. c.) and that of *Anodonta grandis* (fig. 45, l. c.); hinge line straight; depth slightly greater than the length; marginal spines three, well developed, the median spine being slightly longer than the two lateral spines; from seven to ten rows of spines, counting the marginal row, on each valve; end of the adductor muscle showing from 35 to 50 distinct bundles of fibers. The exact measurements of 20 specimens are given below.

Length in micra	*Depth in micra*	*Length in micra*	*Depth in micra*
254	280	260	264
256	260	260	264
258	264	260	280
260	266	264	274
260	280	266	272
260	272	266	272
260	270	268	272
260	272	270	280
260	270	272	280
260	270	272	280

The modal average of the specimens examined gives an average length of about 260 and an average depth of about 270, the range of variation being 254 to 272 for the length and 260 to 280 for the depth. Surber (p. 8, l. c.) states that the length is greater than the depth in *Strophitus edentulus* and gives 350 for the length and 285 for the depth as average measurements.

The behavior of the living glochidia was interesting in the light of the work of Lefevre and Curtis (Bur. Fish. Doc. 756, 1912) on the metamorphosis of *Strophitus edentulus* without parasitism. These writers state (p. 173) that they were unable to bring about the attachment of the glochidia to fish. Our glochidia of *Strophitus edentulus pavonius* were offered gills from the Topminnow, *Fundulus zebrinis* Jordan & Gilbert and of the Sunfish *Lepomis cyanellus* Rafinesque (these two species of fishes are found in St. Vrain Creek) immediately after the gills were removed from the body of the fish. Fish blood caused an evident increase in the activity of the glochidia and several glochidia seized gill filaments. Once attached the glochidia remained on the gill filament until the experiment was discontinued, i. e. for several hours. No attempt to infect living fish with the glochidia of *Strophitus edentulus pavonius* was made, but the behavior of the living glochidia suggests physiological differences between the glochidia of *Strophitus edentulus* and these western specimens of *Strophitus edentulus pavonius.*

University of Colorado, May, 1918.

NOTES ON NIDIFICATION IN GILLIA AND AMNICOLA.

BY FRANK COLLINS BAKER.

Observations on the nidification and embryology of our American fresh-water mollusks are rare; and contributions to our knowledge of this subject, though they may not be extensive, are of value. With this need for additional knowledge in mind, the writer ventures to present the following fragmentary notes on the nidification of two common genera of American Amnicolidæ, two species of which have but recently been described.

The observations were made while conducting quantitative studies of the animal life of Oneida Lake, New York State's largest inland body of water. The eggs of four genera of mollusks were observed at this time (the latter part of July and the first part of August), *Gillia, Amnicola, Galba*, and *Physa*. Only the first two genera are considered in this paper. It was hoped that time would permit a more extensive study of these embryos, but the quantitative studies extended to such a late date that there was no opportunity to carry on the very interesting studies on the development of these snails, which would have been of great interest and some value. The information gathered, however, may be considered a contribution to our knowledge of the embryology of these mollusks and may stimulate other students to a study of our fresh-water gastropods.

Gillia altilis (Lea). Pl. 2, figs. 1-8.

Gillia altilis is a very common species in Oneida Lake in the quiet bays, among vegetation. Egg-laying apparently takes place late in June or early in July. In eggs examined July 31st, the embryos were nearly ready to be hatched, the embryonic shell being fully formed. Eggs were observed on six species of plants; *Vallisneria spiralis* (abundant near base), *Pomatogeton robbinsii* (on lower three or four leaves), *Potamogeton perfoliatus, Scirpus smithii, Scirpus americanus*, and *Sagittaria latifolia*.

The eggs are laid singly (never in a capsule as in the

fresh-water pulmonates), either alone or in groups of one, two, or more, but never exceeding six in any one group (as far as observed). As a rule, many eggs were crowded in a small space on the plant surface (see figures 1-3). On some plants but one side of a leaf contained eggs while other leaves contained eggs on both sides of the leaf. Several areas of the leaves of different plants were measured and the number of eggs in this area were counted, with the result shown in table No. 1. These figures indicate the great abundance of the eggs of this mollusk. The leaf used for attachment was generally of a living plant, but in many cases the dead and partly decayed leaves and pieces of plants were utilized for this purpose. In the table all leaves were about 6 mm. wide.

TABLE No. 1. Number of Eggs of *Gillia altilis* on Plants.

Plant.	Length of Leaf.	No. of Eggs.
Vallisneria spiralis	50 mm.	70
" "	60 mm.	160
" "	50 mm.	22
" "	100 mm.	69
" "	75 mm.	132
" "	75 mm.	73
" "	90 mm.	68
" "	45 mm.	33

The eggs are somewhat hemispherical in form, 1.25 mm. in diameter, the thickness being about a third of the diameter. Upwards of 80 per cent of the eggs contained living embryos, the balance being dead; a number of these were filled with protozoa. The envelope of the egg is very transparent and the embryo is transparent enough to permit some of the organs of the body to be seen through the mantle and transparent shell. The heart, placed near the aperture of the shell, was observed to pulsate very rapidly in all the embryos, in one individual 87 pulsations per minute.

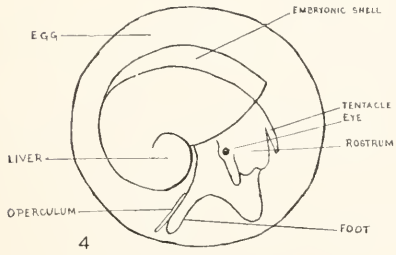
Nearly all of the embryos were in an advanced stage of development, the embryonic shell as well as the external organs of the body—rostrum, tentacles, eyes, operculum, etc.—being fully formed (fig. 4). The embryos moved about in the egg

1

3

2

7



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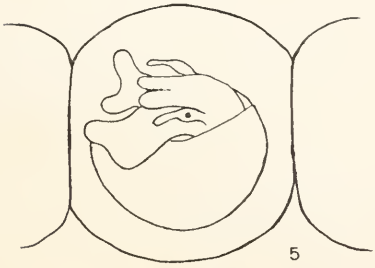


5

8

9

10

BAKER: GILLIA AND AMNICOLA.

in the same manner that adult *Gillia* and other Amnicolidæ browse over vegetation, the proboscis moving slowly about and the radula being protruded as in the adult animal. There appeared to be a regular circular movement of the embryo around the area of the egg capsule. A favorite position of the young animal when at rest is shown in figure 5. The rostrum appears to be cleft at the extremity in some individuals and the anterior part of the foot varies greatly in form when the young animal is active (fig. 6).

The embryonic shell is transparent, spermaceti-white in color and about 1.25 mm. in diameter. It consists of rather more than one whorl which enlarges rapidly (fig. 7). The nucleus and a large part of the shell is covered with very fine spiral lines, the lines of growth beginning abruptly near the aperture. The umbilicus is of medium size and rather deep (fig. 8).

Amnicola oneida or *bakeriana* Pilsbry. Pl. 2, figs. 9, 10.

The lenticular eggs of *Amnicola* (figs. 9, 10) were notably abundant in many localities covering all objects on the bottom, including living and dead vegetation, dead and living shells, and bottom debris. Two species, recently described,[1] are represented. It is impossible to differentiate the eggs of the two species, as both occurred with the eggs, but it is suspected that the narrower form of egg (fig. 9) is from *oneida* and the wider form from *bakeriana* (fig. 10). It will be noted that the form of these eggs differs from the figure given by Stimpson[2] for *Amnicola limosa* in which the egg is much attenuated at both ends. The eggs of the new *Amnicola* were especially abundant in filamentous algæ (*Cladophora fracta* and *Œdogonium* species), the long filaments often being covered with the lens-shaped eggs. *Scirpus*, *Vallisneria*, and other plants were also used for attachment. An effort was made to ascertain the number of eggs on certain species of plants in a measured area, with the result shown in table No. 2. In *Vallisneria*, eggs occurred on both sides of the leaf.

[1] Pilsbry, NAUTILUS, XXX, pp. 44-46, 1917.

[2] Researches upon the Hydrobiinae, etc., Smith, Miss. Coll., fig. 7, 1865.

TABLE No. 2. Number of Eggs of *Amnicola* on Plants.

Plant.	Size.	No. of Eggs.
Vallisneria spiralis	70 x 5 mm.	44
" "	70 x 5 mm.	27
" "	153 x 5 mm.	257
" "	140 x 5 mm.	58
" "	140 x 5 mm.	222
" "	89 x 5 mm.	23
" "	53 x 5 mm.	93
Potamogeton perfoliatus, leaf ..	64 x 10 mm.	16
" "	165 x 28 mm.	150
" "	25 x 5 mm.	21
Potamogeton perfoliatus, stem ..	72 x 2 mm.	42
Potamogeton robbinsii, leaf	19 x 10 mm.	55
" "	38 x 10 mm.	42
Scirpus occidentalis	95 x 12 mm.	33
" "	111 x 12 mm.	54
" "	77 x 6 mm.	76
" "	77 x 8 mm.	141
Scirpus americanus	111 x 3 mm.	200
" "	111 x 3 mm.	36
" "	165 x 3 mm.	150

Quantitative studies show that *Amnicola* is the dominant genus of mollusks in the part of Oneida Lake examined, and the vast number of the eggs of this snail indicates that the group is fully maintaining itself. This fact is of importance economically, as several fish of food value—perch, pumpkinseed, bluegill, sunfish, catfish, sucker—as well as a few smaller fish preyed upon by larger and valuable food fish, use these snails as food. The eggs of *Amnicola* were observed in midsummer (July 25 to Aug. 4), and the condition of the embryos (in the trochosphere stage) indicate that they would be hatched from the middle to the latter part of August.

EXPLANATION OF FIGURES, PLATE 2.

1. Eggs of *Gillia altilis* on leaf of *Scirpus smithii.*
2. Eggs of *Gillia altilis* on leaf of *Vallisneria spiralis.*
3. A single egg of *Gillia* on leaf of *Vallisneria.*
4. Embryo of *Gillia* about ready to hatch.
5. Embryo of *Gillia* in resting position.

6. Embryo of *Gillia;* forms assumed by fore part of foot.
7. Shell of *Gillia altilis*, top view showing rapid enlargement of whorl.
8. Shell of *Gillia* viewed from the front.
9. Egg of Amnicola (? *oneida*) on leaf of *Vallisneria*.
10. Egg of *Amnicola* (? *bakeriana*).

PLEISTOCENE FOSSILS OF MAGDALENA BAY, LOWER CALIFORNIA, COLLECTED BY CHARLES RUSSELL ORCUTT.

BY WILLIAM HEALEY DALL.

In a recent visit to Magdalena Bay, Mr. Orcutt obtained a series of Pleistocene fossils from a deposit on Magdalena Island which prove very interesting. A number of the species average larger than the recent forms of the same name, others, like *Strombus granulatus*, are uniformly smaller. Many of the species have not been reported from so far north in the recent state, and on the whole the assembly has a more topical aspect than that of the recent fauna. One or two of the largest forms appear to be new. The list follows:

Bullaria aspersa A. Adams.
Terebra armillata Hinds.
Conus fergusoni Sowerby.
Conus vittatus Hwass.
Conus, *cf.* ximenes Gray.
Conus purpurascens Broderip.
Conus lucidus Mawe.
Conus tornatus Broderip.
Surcula maculosa Sowerby.
Crassispira nigerrima Sowerby.
Cancellaria obesa Sowerby.
Cancellaria candida Sowerby.
Cancellaria cassidiformis Sowerby.
Lyria (Enaeta) cumingi Broderip.
Vasum caestus Broderip.
Oliva incrassata Solander.
Olivella dama Mawe.
Phyllonotus stearnsii Dall, n. sp.
Phyllonotus bicolor Valenciennes.
Phyllonotus princeps Broderip.
Solenosteira anomala Reeve.
Patellipurpura patula Lamarck.
Thais biserialis Blainville.
Thais kiosquiformis Duclos.
Macron aethiops Reeve.
Arcularia tegula Reeve.
Strombina dorsata Sowerby.

Strombina solidula Reeve.
Strombus gracilior Sowerby.
Strombus granulatus Wood.
Cypraea annettae Dall.
Trivia radians Lamarck.
Cerithium gemmatum Hinds.
Turritella nodulosa King.
Neverita recluziana Deshayes, small variety.
Polinices uber Valenciennes.
Crepidula excavata Broderip.
Crucibulum imbricatum Sowerby.
Crucibulum spinosum Sowerby.
Fissurella volcano Reeve.
Fissuridea murina Carpenter.
Astraea undosa Wood.

Ostrea veatchi Gabb.
Pecten circularis Sowerby.
Cardium biangulatum Sowerby.
Cardium procerum Sowerby.
Metis alta Conrad.
Tagelus violaceus Carpenter.
Parvilucina approximata Dall.
Phacoides lamprus Dall.
Phacoides lingualis Carpenter.
Diplodonta (Felaniella) sericata Reeve.
Diplodonta orbella Gould.
Divaricella eburnea Reeve.
Aligena cerittensis Arnold.
Dosinia ponderosa Gray.
Macrocallista squalida Sowerby.
Macrocallista orcutti n. sp.
Chione succincta Valenciennes.
Chione undatella Sowerby.
Anomalocardia rugosa Sowerby.
Cyathodonta undulata Conrad.
Cryptomya californica Conrad.
Schizothaerus nuttallii Conrad, var. capax Gould.
Panope generosa var. taeniata n. var.

Macrocallista orcutti n. sp.

Shell ovate-triangular, convex, inequilateral, solid and very heavy, six inches long, the beaks two and one-half inches behind the anterior end, incurved, prosocoelous, having neither lunule nor escutcheon; the surface smooth except for slight incremental undulations, irregular, but stronger toward the ends and near the base, where they are sometimes supplemented by fine striations; anterior slope more abrupt than the posterior, both ends rounded, the posterior moderately attenuated, the base roundly arcuate; hinge of the type of that of *M. squalida* but more concentrated, the posterior car-

dinal more than half as long as the nymphal callosity; muscular scars large, the anterior deeply impressed; there is no subumbonal cavity; pallial sinus short, extending forward less than half the length of the shell, acute, subtriangular; margin of the valves smooth. Length of shell 158; height 135+; diameter of right valve 40 mm.

A single slightly imperfect right valve was obtained on Magdalena Island. Than its nearest recent relative, *M. squalida*, it is larger, more rounded, much heavier, with a less uniformly smooth surface, and more concentrated hinge. In *M. squalida* the right posterior cardinal is less than one-third the length of the nymph, and the pallial sinus somewhat more than half as long as the shell. The type specimen is in the National Museum collection. It seems to be the heaviest Venerid of the coast except *Tivela stultorum*.

Panope (*generosa* Gould var.?) *taeniata* n. sp.?

Shell in a general way resembling *P. generosa*, from which it is best distinguished by a differential diagnosis. The shell of *taeniata* is more arcuate, more attenuated behind, less squarely truncate, the valve more inflated, with more of a cavity under the beak, with a shorter ligament, and with the posterior adductor scar nearly circular, while in *generosa* it forms an elongate oval; the anterior scar is also larger and wider than in *generosa*. Length of shell six and three-quarter inches, height three and seven-eighths, diameter of left valve an inch and a quarter. Compared with *generosa* the dimensions are as follows in millimeters.

M. taeniata, lon. 170, alt. 103, diam. 60, truncation 65.

M. generosa, lon. 172, alt. 97, diam. 48, truncation 78.

The left valve of *taeniata*, from which this description is drawn up, has a narrow rounded low rib extending from near the beak to the lower margin near the base of the truncation, but none of the specimens of *generosa* show anything of the kind. This, however, may be an individual mutation and requires confirmation by other specimens. The valve described was found on the beach, probably washed out of the deposit from which the fossils were obtained.

Murex (*Phyllonotus*) *stearnsii* new species.

Shell small, white, tinted with reddish brown on the varices of which there are eight, thick and wide, on the early whorls and seven on the last whorl; nucleus small, smooth, of two whorls, followed by about five subsequent whorls; shoulder high, rounded, the space between it and the suture pit-like between the varices; spiral sculpture of nine or ten low, strong ridges, incurved and guttered on the summit of the varices, with an intercalary series of smaller cords, the whole sharply spirally threaded and crossed by fine, rather sharp axial threads between the cords; aperture oval, hardly lirate, canal short, broad, almost closed, the base of the whorl somewhat constricted. Height 50, diameter of shell 35, length of aperture and canal 33 mm.

Fossil on Magdalena Island. Recent from Acapulco to Manta, Ecuador.

This is nearest to *P. humilis* Broderip, of Panama, which has recurved spines, is generally more compact, and when adult much smaller.

LIST OF SHELLS FROM ANGEL AND TIBURON ISLANDS, GULF OF CALIFORNIA, WITH DESCRIPTION OF A NEW SPECIES.

Collected by L. C. Decius and A. D. Fyfe, November, 1917.

BY I. S. OLDROYD.

ACANTHINA ANGELICA, n. sp.

Shell elongate with sloping shoulders, surface with heavy revolving striæ crossed by fine longitudinal ribs, which overlap forming a net-work; color grayish with markings of chocolate-brown here and there. Whorls five; aperture purplish within; columella straight, same color as aperture; outer lip thickened, dentate and with a strong tooth at its base. Alt. 26, diameter 13 mm. Canal short, open. It is nearest to *Acanthina engonata* Conr., but differs from it in slope of shoulders, sculpture, and color of aperture.

Type is in the Stanford Collection.

Type locality, Redondo Bay, Angel Island, Gulf of California.

ANGEL ISLAND SPECIES.

Polinices recluziana Desh.
Columbella fuscata Sowb.
Trivia solandri Gray.
Pecten subnodosa Sowb.
Fusinus dupetithouarsi Kien.
Bullaria gouldiana Pils.
Pecten dentatus Sowb.
Pododesma adamsi Gray.
Arca multicostata Sowb.
Chione undatella Sowb.
Crucibulum imbricatum Brod.
Turbo flexuosa Wood.
Murex elenensis Dall.
Cassis abreviata Lam.
Conus dalli Stearns.
Pinna rugosa Sby.
Trivia solandri Gray.
Cypraea annetta Dall.
Phacoides sp.
Cardita affinis Sby.
Hipponix barbatus Sby.
Nerita sp.
Diplodonta orbella Gld.
Opalia crenatoides Cpr.
Terebra variegata Gray.
Natica bifaciata Gray.
Acanthina sp. worn.
Cassis coarctata Gray.
Pecten circularis Sowb.
Phyllonotus bicolor Val.
Olivella dama Mawe.
Paphia grata Say.
Modiolus modiolus Linn.
Glycimeris giganteus Rve.
Crepidula onyx Sby.
Cerithium interruptum C. B. Ad.
Conus regularis Sowb.
Thais haemastoma Linn.
Acanthina muricata Brod.
Surcula olivaceus fumiculata Val.
Chiton 2 sp.
Chione fluctifraga Sowb.
Turritella gonostoma Val.
Alectrion versicolor C. B. Ad.
Arca solida Sby.
Tegula viridula reticulata Wood.
Alectrion affinis Sby.
Arca reeviana Orb.

TIBURON ISLAND SPECIES.

Diplodonta sericata Rve.
Paphia grata Say.
Pecten dentata Sby.
Hipponix antiquata Linn.
Heterodonax bimaculatus Orb.
Arca reeviana Orb.
Diplodonta orbella Gld.
Olivella dama Mawe.
Conus ximenes Gray.
Cardita affinis Brod.
Hipponix barbata Sby.
Pododesma adamsi Gray.

A NEW SPECIES OF CUSPIDARIA FROM MONTEREY.

BY I. S. OLDROYD, STANFORD UNIVERSITY, CALIFORNIA.

CUSPIDARIA (TROPIDOMYA) NANA, n. sp.

Shell small and slender; subventricose, the surface sculpture with numerous fine concentric lines of growth; the umbo anterior to the middle of the shell. Anterior portion obese, posterior slender, prolonged and slightly twisted, not gaping; with a sulcus reaching from the umbones to the rear of the shell. Hinge with no lateral teeth, a small anterior cardinal in the right valve, ligament obsolete, internal resilium strong, set in a prominent, posteriorly inclined resilifer with a strong quadrate lithodesma immediately in front of it. Pallial sinus short rounded, margins entire. Length 25, height 13 mm.

Type in the Oldroyd collection, Stanford University, Cal.

Type locality, Monterey Bay, California. Living in clay. Two specimens were found.

There is one specimen in the Hemphill collection, collected by Mr. Hemphill at Bolenas, California.

ANOTHER "MARTYN".

BY BRYANT WALKER.

The arrival in this country of a third [1] four-volume copy of Martyn's "Universal Conchologist" seems worthy of record, especially as this differs in several details from those that have been described by Dall, Johnson and Dautzenberg.

It was obtained from Messrs. William Wesley and Son of London, England, and is now in my library. There is nothing to show who had previously owned it.

The four volumes are bound as two in finely-tooled calf,

[1] This is probably a fourth copy, as a four volume set was acquired a few years ago by the Academy of Natural Sciences, No. 406 Conch., of the library.—EDS.

which was rather the worse for wear when received. The plates measure 12 $^{13}/_{16}$ by 10½ inches.

None of the circulars mentioned in connection with certain other copies are found with this.

Bound in with the original indices is a MSS. index written in a large engrossing hand. The plates are numbered consecutively in the upper right-hand corner in ink and evidently by the same hand that wrote the index, with the following exceptions: Plate 5 has no number at all; twenty-four plates have the original engraved numbers in the upper right-hand corner and eleven others, in addition to the written numbers in the upper corner, have the original engraved number, running longitudinally with the page, in the lower right-hand corner. Of these thirty-five engraved numbers, three are simply numerals. The others have in addition to the number a letter appended. Thus plate 8 is engraved "Fig^{e} 8—d" and plate 153 is engraved "Fig^{e} 153 —ppp". All of the plates with written numbers in volumes I and II are written "No I", &c., while those in volumes III and IV, down to and including plate 155, are written "Fig. 81", &c. The remaining plates have simply the numerals.

In all of the four volumes there are considerable differences in the neat-lines surrounding the figures. Some have an inner border of three lines, of which the center one is much the heavier and an outer narrow one, while others have only a single heavy line for the inner border. Eighteen of the plates in volumes III and IV have no neat-lines at all. The neat-lines, when present, were evidently added by hand and not engraved.

Plate 73 and eighteen others in volumes III and IV are initialed "H", evidently in the same handwriting as the written index, and plate 82 has endorsed on it: "(26 plates) H".

Two of the additional plates in volume IV are signed "E. Sewell", one in plain Roman letters and the other entirely in capital letters.

Volumes I and II, with the possible deviations noted above, are in all other respects the same as the copy in the National Museum described by Dr. Dall in 1905, excepting:

(1) That the French title-page reads "Les Figures", &c., instead of "Des Figures", as in that copy.

(2) There are two plates numbered "30—1" and "30—2" giving an upper and under view of the shell figured, and two numbered "72—1" and "72—2". The written index states that "72—2" is a variety of "72—1".

(3) Plates 43 and 59 have two views of the shell as in the Henderson copy, but plate 57 has only one figure as in the National Museum copy. The figures on plates 61 and 63 are also arranged as in the Henderson copy.

Volumes III and IV have no separate title-pages, simply the engraved explanatory tables. These tables agree with those quoted by Dr. Dall from the Sydney copy except that the generic name is frequently omitted in the second column, usually from lack of room when a varietal name was given.

The first species on plate 109 is given as "Pellis Armeniana" and not Arminiana.

Plate 129 is indexed as (Voluta) "Aplustre Ducis Navalis".

The second species on plate 135 is given as "Denrachates".

The first species on plate 137 is indexed as "Cælata".

Plate 143 is given as (Cochlea) "Albida".

Plate 154 is given as "Ostrea Echinata".

The first species on plate 156 is indexed as "Tellina cinnamea".

There are forty-three plates in volume III.

Plate 88 is a costate shell and would seem to agree with the name given in the engraved index. Plate 88* is a smooth shell. No specific names are given for either species in the written index.

Plate 115 is duplicated. The first plate contains two figures of the typical form of *Amphidromus aureus* (Martyn) corresponding to those given in the Manual of Conchology, XIII, pl. 54, figs. 70 and 71. The front view is of a sinistral specimen, the back view is from a dextral one. The second plate gives two views of a dextral specimen of the unstriped form corresponding to fig. 72 of the plate in the Manual of Conchology.

Plate 116 is also duplicated and represents two color forms

of a beautiful sinistral *Amphidromus*, which I cannot assign to any of the species figured in the Manual of Conchology. The habitat is given as "Barbadoes", an impossibility, and the shells figured are stated to be in the cabinet of Mr. Forster. In the introduction (p. 18) Martyn states that "For exquisite taste and judgment in the various subjects of Conchology, Mineralogy and every other species of fossil bodies, perhaps no collector has more distinguished himself than Mr. Jacob Forster, to whose constant application in the pursuit of everything rare and beautiful in these branches it is chiefly owing that such matchless specimens now adorn his own, as well as other principal cabinets of Natural History in this kingdom".

A very large proportion of the shells figured in volumes III and IV are stated to be in Mr. Forster's collection. His address is given as "Piazza, Covent Garden".

There are fifty-two plates in volume IV.

In addition to the forty plates enumerated in the engraved index, there are twelve additional plates numbered 161 to 172 inclusive. It is probable that these plates are part, at least, of those prepared for the fifth volume before the project was abandoned as stated by Chenu (Dall, 1905, p. 420).

No names are given on any of the plates except No. 169, which has the following legend in ink:

"Strombus Fusus."

"This curious shell was taken up by the anchor of the Albion, East Indianman, in the Straits of Macassar (quere Sunda) in 1794 by Wm. Wells Esq'r and given to Mrs. Robson, who sold it and it was afterwards in the possession of Mr. Troward."

Only a portion of the species represented by these plates are identified in the written index. The following are named:

Plate 161. Murex neritoideus (Ricinula Lam.).
162. M. hippocastaneum "
165. Cook's Turbo.
169. Strombus fusus.

170. "Same as 89."
172. Murex babylonius.

Plate 156 was represented only by a blank, but numbered, page in this copy when received. Through the courtesy of Mr. C. W. Johnson, I have been able to supply the omission by an admirable water-color copy of the plate in the copy owned by the Boston Society of Natural History.

The written index, while of course of no scientific value, is of interest both as showing the changes that had been adopted in current nomenclature between the date of the engraved index and that of the written one and as affording an, at least, approximate date when the present copy was put together and bound.

In the nomenclature of the species represented on the 160 plates covered by the engraved index, there are no less than 89 changes in generic and 87 in specific names in the written index. The accepted nomenclature of the written index is apparently that Gmelin, whose Systema Natura was published in 1788-1792. Thus the two species illustrated on plate 67 are given in the engraved index as *Limax nucleus* and *L. faba*. The former is now known as *Cassidula nucleus* (Martyn) and the latter as *Partula faba* (Martyn). In the written index both are referred to "*Helix*". According to Pilsbry (Man. Con., XX, p. 236) Gmelin was the first to designate the latter as "*Helix faba*" in 1791, and according to Kuster (Con. Cab., Auriculacea, 1841, p. 29) he also referred *nucleus* to the same genus.

Everything in the make-up of this copy seems to indicate that it must have been one of the latest copies issued and was made up of such plates as were then on hand. The entire omission of plate 156 would seem to show that there were no copies left of that plate. The numeration, part written, part engraved, and some both written and engraved; the lack of uniformity in the matter of the neat-lines and the addition of twelve plates not included in the original work, all point in the same direction.

In the written index under plate 67 (*Cypræa aurantium*) is appended the following note: "N. B. See Ency. Brit., v. 9,

p. 508. A fine young shell of this species was brought from Guam, one of the Ladrona Islands in the Pacific Ocean near Japan, in 1822 and was sold for £25''.

This clearly fixes the date of the written index as later than 1822.

Plate 67 has written on it in the lower corner in pencil and in a handwriting entirely different from that of the written index (presumably by some subsequent owner), ''This is not plate 69''. The same note and in the same handwriting also appears on plates 94, 111, 135 and 152. Possibly a comparison with a perfect copy would show that the missing plates are included in the additional plates in volume IV and were misplaced by careless handling in arranging the plates for the binder.

BOSTON MALACOLOGICAL CLUB.

The Boston Malacological Club has held its regular meetings during the past season—its eighth year. These meetings have been well attended; many interesting papers have been given and specimens exhibited. The general enthusiasm and good-fellowship prevailing shows that the Club has a permanent place among the scientific activities of Boston.

At the October meeting Mr. William F. Wells, Scientific Assistant in Shell-fish, U. S. Bureau of Fisheries, gave an interesting communication on the ''Possibilities of Scientific Oyster Culture.'' The Club also had the pleasure of a visit from Dr. William H. Dall, of the U. S. National Museum.

In November the Rev. Oliver P. Emerson gave a talk on ''Collecting Achatinellidæ.'' A residence in Hawaii for thirty-five years gave him every opportunity for studying these interesting shells and to make a large and beautiful collection.

In December Mr. J. Henry Blake spoke on ''Collecting at Provincetown, Mass.,'' noting the many changes that have occurred affecting the molluscan fauna. Mr. C. J. Maynard spoke on collecting Cerion in the Bahamas. The Club at this

meeting also had the pleasure of a visit from Professor William A. Bryan, of the College of Hawaii, Honolulu. He gave a very interesting account on the variation of species of Melaniidæ in different parts of the same stream.

The January meeting was devoted to paleontology, Dr. Hervey W. Shimer, speaking on the Cephalopoda and Pelecypoda, and Dr. Percy E. Raymond on the Gastropoda.

In February Mr. Charles W. Johnson spoke on the variation of *Litorina rudis, L. obtusata palliata* and *Thais lapillus*, illustrated by a large series of specimens from various localities on the New England coast and Europe.

At the March meeting Dr. Edward C. Van Dyke, of San Francisco, spoke on collecting on the Pacific slope, and gave some interesting points bearing on the zoogeography of the region. It being the annual meeting, Mr. J. Henry Blake was elected president to succeed Mr. John Ritchie, Jr.

In April Mr. John Ritchie, Jr.'s subject was "Miscellany," and Mr. Arthur F. Gray exhibited photographs and letters of noted conchologists.

At the May meeting an interesting discussion was presented by Professor Edward S. Morse on "Protective Coloration," and by Mr. Francis N. Balch on "Problems of Coloration in Mollusca."

The field meeting of the year was to Fresh Pond, Cambridge, classic collecting ground for fresh-water mollusks.

E. G. Humphrey, *Secretary.*

NOTES.

Olivella biplicata angelena, var. nov.

This variety differs from Sowerby's type in being more delicate and slender, with callous not so heavy, spire more elevated, sloping more gradually from the middle of the shell to the apex. Sowerby's type came from Monterey and does not occur near San Pedro living, but is found fossil there in the Pliocene and lower Pleistocene. Variety *angelena* is found fossil in both the upper and lower San Pedro beds of the Pleistocene.

Length of type 27, width 13 mm.
Type is in the Oldroyd collection, Stanford University.

T. S. Oldroyd.

Pressodonta *rediviva*.—In some notes on the *Unionidæ* recently published (Occ. Papers, Mus. Zool., Univ. Mich., 49, 1918, p. 2) I proposed to replace *Pressodonta* Simp. (1900) by *Calceola* Sw. (1840) on the ground of priority, both groups having the same type. Dr. Dall has since called my attention to the fact that "*Calceola* was used by Lamarck in 1799 for a coral (long supposed to be a Brachiopod)." This restores *Pressodonta* to its place as the proper name for the subgenus. The error is one of the unfortunate results of not having access to a general scientific library.—Bryant Walker.

Mr. Horace F. Carpenter has presented to the City of Providence and has installed in the museum at Roger Williams Park his entire collection of minerals and shells. It consists of about 4,000 species of shells, 75,000 specimens, 1,200 species and varieties of minerals, over 200 rare chemical salts, and 50 wooden models of mineral crystals. A microscope with accessories for conchological and mineralogical work, and a library of about 200 volumes on natural history and chemistry, worth about $1,500. This collection represents a life labor of 60 years. Mr. Carpenter has spent nearly a year in installing, arranging and labeling these specimens at the museum.

PUBLICATIONS RECEIVED.

Notes on West American Chitons, I. By S. Stillman Berry. Proc. Calif. Acad. Sci., 4 ser., vol. vii, pp. 229-248., Sept. 1917 (received May 17, 1918). These interesting notes are based on a large and valuable collection made by Mr. George Willett in southern Alaska, comprising 25 species and 622 specimens. Two new species, *Ischnochiton* (*Lepidozona*) *willetti* and *Placiphorella rufa*, are described and figured, followed by a note on the genus *Trachydermon*.

Preliminary Descriptions of New Species of Pulmonata of the Galapagos Islands. By W. H. Dall. Proc. Calif. Acad. Sci., 4 ser., vol. ii, pt. 1, pp. 375-382, Dec. 1917 (received May 17, 1918). Thirteen new species of *Bulimulus* subgenus *Naesiotus*, a new *Helicina* and *Williamia galapagana* are described.

Note on Chrysodomus and Other Mollusks from the North Pacific Ocean. By W. H. Dall. Proc. U. S. Nat. Mus., vol. 54, pp. 207-234, 1918. An exhaustive account of the genus and the allied forms now grouped under the family Chrysodomidæ. The nuclei or larval shells of the various genera present several distinct types and numerous mutations. "In many cases, as in *Buccinum* and *Busycon*, it was shown many years ago by Lovèn and others that a single ovicapsule contains a number of ova fertile and unfertile. The unfertile eggs serve as food for the larvæ developed from the fertile ones and there is a certain amount of competition between the larvæ in the capsule which results in the most vigorous larvæ getting more food and making a larger growth than the more weakly coinhabitants of the capsule. Thus at the time of leaving the capsule and coming into the outer world, it sometimes happens that there will be perceptible differences between the individuals issuing from a single capsule, not only in actual size but in the length of the coil of whorls and the size and compactness of the larval apex." The rules of nomenclature necessitates the use of *Chrysodomus* instead of *Neptunea*. Under the genus *Searlesia* is placed the *C. dirus* of the west coast. The other genera comprising the family are: *Ecphora, Colus, Siphonorbis, Kryptos, Plicifusus, Exilia, Volutopsius, Pyrulofusus, Beringius, Liomesus* and *Ancistrolepis*. Fifteen new species are described. C. W. J.

Notes on the Nomenclature of the Mollusks of the Family Turritidæ. By W. H. Dall. Proc. U. S. Nat. Mus., vol. 54, pp. 313-333, 1918. A very useful and timely paper.

THE NAUTILUS.

Vol. XXXII. OCTOBER, 1918. No. 2

THE AVICULA CANDEANA OF D'ORBIGNY, FROM BERMUDA.

BY CHARLES W. JOHNSON.

Among the mollusca collected by Mr. Owen Bryant at Bermuda in the summer of 1903, was a specimen referable to the genus Malleus of authors. At the time I urged Mr. Bryant to describe it and he started to do so. I do not wonder that the monographs in the Conchologia Iconica (Vol. XI) and in the Conchylien Cabinet (VIII, 1) baffled him, and when I showed him d'Orbigny's description of *Avicula candeana* in La Sagra's Cuba, he "threw up the sponge," and on leaving Boston turned the specimen over to me.

The specimen was put aside, and the press of museum work has prevented me from recording this interesting shell before. At this time the pleasure of doing so is greatly marred by the possibility that the appropriate and familiar name of *Malleus* Lamarck 1799, might have to fall before the older name of *Pinctado* Bolten, 1798.

My friend Mr. Charles Hedley in his list of the mollusca of New South Wales, ingeniously places *Malleus vulgaris* under the genus *Pinctado* and *M. albus* under *Malleus*. This is a very nice way of arranging them so as to retain the old genus *Malleus*; but do they really represent two genera? What shall we do with all of the smaller, auriculate forms? Although the species seem difficult to separate in the early stages of their growth, the adult shells of the auriculate species are quite readily separated from the true "hammer oysters," and the simplest plan would be to adopt provisionally a third name to cover these.

In 1884 De Gregorio proposed the name *Fundella* for a shell, with the hinge as in *Malleus*; structure of the shell and inequality of the valves as in *Ostrea*; cardinal line straight, and a wing as in *Avicula*, shell gaping on one side; external aspect of the summits as in *Anomia*; interior as in *Ostrea*. Type *F. lioyi*, n. sp., 25 mm., in a sponge from the abyssal zone of the mediterranean, off Tunis. E. von Martens, who compiled the mollusca in the Zool. Record for 1884, in commenting on the species says: "photograph, not very clear figure, much resembles the young state of *Malleus regula* (Forsk.) from the Red Sea." Fischer in his Manuel makes *Fundella* a section of *Malleus*, with the following diagnosis: anterior ear obsolete, and with a longitudinal, median ridge on the interior of the valves; giving as the type, *M. candeanus* d'Orbigny. Did Fischer consider De Gregorio's species to be the same as d'Orbigny's? I am inclined to think he did. From the description and figures I see no characters to separate them. Orbigny looked upon it as a deformed *Avicula* (*Pteria*), with the characteristics of that genus when young and of *Malleus* when in the adult stage. Dr. Dall under *Electroma* Stoliczka, (type *Avicula smaragdina* Reeve) says: "The latter (*Electroma*) may be represented in the recent fauna of the Antilles by *Avicula candeana* Orb., which seems to owe its characters to commensalism with sponges."

Fundella candeana (d'Orbigny).

Avicula candeana d'Orb. Hist. de Cuba, La Sagra, Moll. II, 343, pl. 28, figs. 25–27, 1853.

Malleus vesiculatus Reeve, Conch. Icon. (*Malleus*) XI, pl. 3, fig. 12, 1858.

Malleus rufipunctatus Reeve, Conch. Icon., XI, pl. 3, fig. 8, 1858.

Fundella lioyi De Gregorio, Bull. Soc. Mal. Ital., X, 73, pl. 4, fig. 6, 1884.

Malleus candeanus Fischer, Manuel de Conch., p. 954, 1887.

Electroma (?) *candeana* Dall., Trans. Wagner Free Inst. Sci., III, pt. 4, p. 668, 1898.

The shell in question was removed from a coralline growth and is greatly deformed as so many of the species of this group

usually are. It measures 45 mm. in length and is of a dark purplish color, with a dull yellowish margin; the structure of the shell is vesiculate, making it thin and brittle; umbones smooth followed by a radial sculpture, which soon changes to irregular, concentric laminae. At this point the growth of the shell was arrested and commenced to grow at right angles to the hinge; byssal opening large, affecting both valves. The pallial line is conspicuously raised, forming a deep, nacre-lined body cavity; from about the middle of the pallial line and extending to the margin of the shell is a median, longitudinal ridge. The object of this ridge seems to be that of strengthening the thin vesiculate portion of the shell, for it is much more prominent in the smaller than in the larger and thicker species, including the two "hammer oysters." This ridge is not present in *Pteria*.

From the descriptions and figures given by Reeve, this species cannot be satisfactorily separated from several species from the Pacific, especially *Malleus vesiculatus* from Isle of Plata, West Columbia. It also resembles except in color *M. rufipunctatus* and *M. aquatilis* from the same locality.

The metropolis of the Malleaceae being the Central Pacific, their presence in the Antillean waters might possibly be due to water connection by the Isthmus of Panama during the late Eocene or early Oligocene, a period when so many of the analogous species now living on the west coast of Central America and in the West Indies, probably had a common origin, but its occurrence in the Mediterranean makes this theory less plausible.

Explanation of Plate III.

Figs. 1 and 2. *Fundella candeana* (d'Orb.). Bermuda. Specimen in the Museum of Comparative Zoology.

Figs. 3 and 4. *Fundella candeana* (d'Orb.). From a photograph of d'Orbigny's figures.

Fig. 5. *Malleus rufipunctatus* Reeve. From a photograph of Reeve's figure.

Fig. 6. *Malleus vesiculatus* Reeve. From a photograph of Reeve's figure.

A MOLLUSK HUNT IN WYOMING.

BY JUNIUS HENDERSON.

The recent molluscan fauna of Wyoming is probably less known than that of any other state in the Union. A number of mountain chains, more or less isolated by broad expanses of plains unfavorable to land snails, promise interesting results from a conchological exploration of the region, especially with reference to the genus *Oreohelix*. I have long looked in that direction with covetous eyes. In 1917 it was my privilege to spend the two weeks from August 23 to September 7 in that region, in company with Edward L. Schwabe. We traveled hastily by auto, with camp outfit, passing almost entirely across the state from south to north. The great distance traveled, together with long stretches of barren territory between collecting places, and the lack of opportunity for side trips into more favorable territory, prevented great results, but we obtained an acquaintance with the region that will be invaluable in planning another and longer season's work in the future. Unfortunately the war conditions have prevented a continuance of the work during the present year. Dr. H. A. Pilsbry has rendered valued assistance in the determination of some of the land shells, and Dr. Bryant Walker has identified or confirmed the identity of most of the fresh-water snails. The *Pisidia*, of which we found very few, were submitted to Dr. V. Sterki some time ago, but as yet I have no report from him. In the card index of the University of Colorado Museum, I find noted the published records of the following species and subspecies for Wyoming:

Columella alticola (Ing.)
Euconulus fulvus alaskensis Pils.
Lymnæa apicina Lea
Lymnæa binneyi Tryon
Lymnæa elodes var.?
Lymnæa jacksonensis Baker
Lymnæa proxima Lea
Lymnæa traski Tryon
Oreohelix cooperi (W. G. B.)
Oreohelix cooperi minor (Ckll.)

Oreohelix cooperi maxima Pils.
Oreohelix pygmæa Pils.
Oreohelix strigosa Gld. (*depressa* Ckll.?)
Oreohelix strigosa extremitatis Pils. & Ferr.
Physa sayi Tappan
Planorbis bicarinatus (*antrosus* Conr.)
Pomatiopsis robusta Walker
Pupilla muscorum (L.)
Pyramidula cronkhitei anthonyi Pils.
Pyramidula striatella Anth.
Succinea avara Say
Vallonia cyclophorella Ancey
Vitrina pfeifferi Newc. (*alaskana* Dall)

Oreohelix cooperi minor should be eliminated from the list, because, in the first place, a re-examination of the material so recorded shows that it is true *cooperi*, and in the second place, investigations recently carried on by me at the type locality of *minor* convince me that the small form so named was based upon examples merely dwarfed by adverse conditions in one portion of a normal *cooperi* colony. Baker has placed the Ft. Bridger record of *Lymnæa elodes* var. in the synonymy of *L. palustris*. The *Pyramidula striatella* record is probably *P. c. anthonyi*, which would still further reduce the list, but it may possibly be *P. shimeki cockerelli* Pils. *Pupilla muscorum* is probably *P. m. xerobia* Pils., but one cannot be certain of it. *Physa sayi* is doubtful, but if not that, it refers to some other *Physa*, so its elimination would not reduce the number of species. This leaves a list of about 22 species, 12 of which are confined to two genera, with no recorded pelecypods at all. Possibly some recorded species have been overlooked by me. The only large land snails are in the genus *Oreohelix; Polygyra*, which occurs to the northward in Montana, not having been found in Wyoming. *Oreohelix* is an ancient genus in the state, *O. grangeri* Ckll. & Hend. and *O. megarche* Ckll. & Hend. occurring in rocks of Eocene age.

Our two weeks' work, besides furnishing new localities for some of the species already recorded from the state, adds the following species, including four additional genera, two of which are pelecypods:

Agriolimax campestris (Binn.)
Ferrissia rivularis Say
Lampsilis ventricosa (Barnes)
Lymnæa bulimoides cockerelli Pils. & Ferr
Lymnæa caperata Say
Lymnæa humilis modicella Say?
Lymnæa obrussa Say
Physa anatina Lea
Physa gyrina Say
Physa integra Hald.?
Physa sayi warreniana Lea?
Physa walkeri Crand.
Planorbis parvus Say
Vallonia gracilicosta Reinh.
Zonitoides arborea (Say)

In a recent paper Daniels and I asserted the probable occurrence of *L. b. cockerelli* in Wyoming, which is now confirmed.

Following is an account of the stations visited and the mollusks obtained at each:

Sta. 232, reservoir where the road from Cheyenne to Casper crosses Lodgepole Creek, about thirteen miles north of Cheyenne.

Pisidium sp.
Agriolimax campestris (Binn.)
Lymnæa obrussa Say
Physa sayii warreniana Lea?
Planorbis parvus Say
Succinea avara Say
Vallonia gracilicosta Reinh.

Sta. 233, a branch of Bear Creek, north of Horse Creek.

Pisidium sp.
Lymnæa obrussa Say
Physa walkeri Crand.

Sta. 234, small reservoir six miles northeast of Wheatland.

Lymnæa caperata Say
Physa gyrina Say
Planorbis parvus Say

Sta. 235, bridge over Laramie river, below Uva.

Lampsilis ventricosa (Barnes)
Lymnæa obrussa Say
Lymnæa humilis modicella Say? (two specimens)
Oreohelix cooperi (W. G. B.)
Pyramidula cronkhitei anthonyi Pils.
Succinea avara Say
Vallonia gracilicosta Reinh.
Zonitoides arborea (Say)
Physa gyrina Say
Physa integra Hald.?
Planorbis parvus Say

Only a single broken example of the *Oreohelix* was found, in the river bottom, and it may have been brought by the stream from far away in the spring flood.

Sta. 236, creek bottom about ten or twelve miles north of Uva, under willows and cottonwoods.

Vallonia gracilicosta Reinh.
Vitrina alaskana Dall.
Zonitoides arborea (Say)

Sta. 237, five miles northwest of Douglas, in a small spring brook.

Lymnæa obrussa Say
Physa gyrina Say
Planorbis parvus Say

Sta. 238, Boxelder Creek, about 18 or 20 miles northwest of Douglas.

Ferrissia rivularis Say
Lymnæa obrussa Say
Physa gyrina Say
Planorbis parvus Say
Pyramidula cronkhitei anthonyi Pils.
Succinea avara Say
Vallonia gracilicosta Reinh.
Vitrina alaskana Dall
Zonitoides arborea (Say)

Sta. 239, a very small reservoir formed by throwing an earth dam across a dry draw to catch the storm waters for stock, four miles west of Arminta. A few very rotten shells of *Lymnæa bulimoides cockerelli* Pils. & Fer. were found.

Many dead salamanders were along the bank and a few live ones were seen in the water. This shallow water-hole did not look as though it could have existed very long, and it was a long distance from any other water. We were much surprised to see several great blue herons fly from the water at our approach, and wondered what they were feeding upon, or we should not have looked for any mollusks there. It would be interesting to know by what agency they got there. Hand (NAUTILUS, XXVII, 1914, p. 144) noted *Planorbis vermicularis* in a small artificial pond in California, and raised the same question, "How did they get there?"

Sta. 240, at base of a rocky sandstone ledge about twelve miles north of Lost Cabin on the road to Ten Sleep.

Pupilla muscorum xerobia Pils.
Vallonia cyclophorella Ancey

Sta. 241, creek bottom about three miles above Ten Sleep.

Agriolimax campestris (Binney).
Oreohelix cooperi (W. G. B.)?
Physa gyrina Say ("peculiar long form")
Pyramidula cronkhitei anthonyi Pils.
Succinea avara Say
Vallonia gracilicosta Reinh.
Vitrina alaskana Dall
Zonitoides arborea (Say)

Only one fragment of *Oreohelix* was found, apparently *O. cooperi*, and it may have been brought down from up-stream in the spring flood. *Agriolimax* is represented by two very small examples.

Sta. 242, creek bottom at Hyattville, among willows, narrow-leafed cottonwoods, etc. *Vallonia gracilicosta* Reinh.

Sta. 243, bottom lands on Shell Creek, at mouth of White Water Creek, about five miles east of Shell.

Lymnæa obrussa Say
Physa anatina Lea
Planorbis parvus Say
Pyramidula cronkhitei anthonyi Pils.
Vallonia gracilicosta Reinh.

Physa anatina is so identified by Dr. Bryant Walker. We have another lot of the same species, also identified by Dr. Walker, collected by Mr. Don W. Walker two and a half miles east of Shell.

Sta. 244, just within the mouth of Shell Creek Canyon, on south side of creek, about two miles above Sta. 243, on limestone ledge devoid of shrubbery and other vegetation except close-clinging lichens on the rock. *Oreohelix yavapai extremitatis* Pils. & Ferr. was plentiful, clinging to the open face of the rocks in plain sight, though the weather was hot and dry. This form has been recorded from the same canyon by Dr. Pilsbry. There were no rock slides or other cover, such as *Oreohelix* usually requires, anywhere near. We obtained 145 live examples and over 200 dead shells in a short search, one of the latter being reversed. I have never before seen any member of this genus in such an exposed position.

Sta. 245, about a mile or so from Sta. 244, same side of creek, under shrubbery. We obtained 31 *Oreohelix yavapai extremitatis* Pils. & Ferr. and 46 *O. pygmæa* Pils. alive, together with many dead shells. This is the type locality of the latter. Two of them were albinos. We also found *Pupilla muscorum xerobia* Pils., *Vallonia gracilicosta* Reinh., and *Zonitoides arborea* (Say).

Sta. 246, just within the mouth of White Creek Canyon, on south side, a couple of miles south of Sta. 245, in a small brush patch a few feet in diameter at the base of a low cliff near an old log building.

Euconulus fulvus alaskensis Pils.
Oreohelix cooperi form *obscura* Hend.
Oreohelix pygmæa Pils.
Oreohelix yavapai extremitatis Pils. & Ferr.
Pupilla muscorum (L.)
Vallonia gracilicosta Reinh.
Vitrina alaskana Dall.

Sta. 247, bluff 50 yards east of Sta. 246. *O. y. extremitatis* Pils. & Ferr. abundant, clinging to rocks and under scant mountain mahogany, clematis, etc., a few out on open ground, all active after the rain of the night before. Two dead shells

of *O. pygmæa* Pils. and seven dead shells of *O. s. obscura* were also found here. The *extremitatis* from this canyon are much less prominently carinated than those from Shell Creek Canyon.

Sta. 248, at base of bluff from 100 to 150 yards east of Sta. 247, under fairly good cover of shrubbery. *O. c. obscura* numerous, with quite a number *O. y. extremitatis* (two albinos) and a few *O. pygmæa*.

Sta. 249, a short distance up the canyon from Sta. 248, where the vegetation about small rock slides at the foot of a high cliff forms good cover for snails, which were very abundant. In a short time we observed 600 live *O. pygmæa*, the same number of *O. c. obscura*, and 58 live *O. y. extremitatis*. Four of the *pygmæa* and six of the *obscura* are albinos. OREOHELIX COOPERI OBSCURA new form.

Ordinarily forms of *Oreohelix* based upon color alone are of doubtful value, but in this case the color is so striking and so uniform that I feel justified in giving to the form from this canyon a name. Of the hundreds of live examples and more hundreds of dead shells examined from stations 246, 247, 248 and 249, not one resembles typical *cooperi* in color, though I detect no other difference. With the exception of the eight albinos, they are all very dark, mostly quite black, not dark red or brown usually, with a rather broad light peripheral band, though this is wanting in many examples. In color they resemble *O. peripherica albofasciata* (Hemph.), but would not be mistaken for that form by anyone familiar with *Oreohelices*. In numbering thousands of *O. cooperi* in the last few weeks I have noticed that there is a scratch beneath the pen, as though it were being dragged across a fine, sharp file, quite different from the sensation experienced in using the pen on other species, of which I have numbered thousands recently. This scratch I noticed in the color form now described.

Most of the shells of the *yavapai* group in White Creek Canyon have the spire much more elevated, scarcely any being as flat as those from Shell Creek Canyon, and, as would be expected, the keel is much less pronounced. In fact, many

of them have the keel as rounded as in *O. s. depressa* (Ckll.) and some have the color bands well developed. A striking feature of this district is the number of albinos occurring in both *pygmæa* and *obscura*. Another unusual feature is the occurrence of three forms of *Oreohelix* intermingled. It is seldom that I have found even two together until the season of 1917, and never before have I found three together, yet at all of the stations in White Creek Canyon this occurs. These stations are really different portions of one great colony, as scattered dead shells were found all along the canyon as far as we traversed it, but we divided it into stations because of differences in cover and other conditions, and variance in the proportionate numbers of the several forms.

A NEW PRIOTROCHATELLA FROM THE ISLE OF PINES, CUBA.

BY WM. F. CLAPP.

PRIOTROCHATELLA TORREI, n. sp.

Shell depressed, trochiform, thin, fragile, above with numerous oblique plications, crossed by raised spiral lines; below *smooth;* whorls, nine, the first smooth, white, the spiral lines beginning on the fourth. Suture of early whorls simple, of later whorls denticulate, and of the last two or three whorls covered with a white moderately denticulate flange. Last whorl descending slightly, aperture very oblique. Color yellow, with irregular white patches and white denticulate sutural flange above, uniform yellow below.

Greatest diam. 13 mm., l. d. 11½ mm., alt. 8 mm. Type in Museum of Comparative Zoölogy, Cambridge, Massachusetts. No. 36888.

This species was discovered by Mr. W. S. Brooks near the *southern* end on the eastern face of the Sierra de Casas, Isle of Pines, Cuba, and later a large series was collected by Mr. Brooks and Dr. Thomas Barbour.

No genus of the great host of West Indian land mollusks is so famed for its beauty and delicacy of structure as *Priotrochatella*. Hitherto but two well-defined species have been known,

and it is indeed rare good fortune to be able now to associate with a third the name of Dr. Carlos de la Torre of the University of Havana. No one has shown a keener or more sympathetic appreciation for, or knowledge of, the shells of his native land than has he.

P. torrei differs from the two species of *Priotrochatella* previously described, *P. constellata* Morelet and *P. stellata* Velasquez, in having the base of the shell smooth, instead of granulose as in *P. constellata*, or with transverse plications as in *P. stellata*. The sutural flange is less coarsely denticulate than in *constellata*, more strongly than in *stellata*. In *P. constellata* the average number of teeth on the periphery of the last whorl is less than 40, in *P. torrei* between 40 and 50, and in *P. stellata* more than 50. *P. constellata* Morelet,[1] was described as from "Sierra de Cristalles." In the southern part of the Isle of Pines there is a hill called the Sierra de Cristales, but the entire local formation is igneous and therefore this certainly was not the type locality of the species. It is possible that some one told Morelet that the Sierra de Casas was called the Sierra de Cristales, which he misspelled. Poey[2] gives the habitat of *constellata* as "Sierra de Caballa, esta sierra esta al Sud de la poblacion llamada Nueva-Gerona." This locality is now definitely known as the Sierra de Casas.[3]

Poey transposed the names of the two mountain ranges in the northern part of the Isle of Pines, referring to the Sierra de Casas by the name of Sierra de Caballa, and to the Sierra de Caballas by the name of Sierra de Casas. Pfeiffer[4] repeats Morelet's locality of Sierra de Cristales. Arango[5] in 1878 gives the habitat of *constellata* correctly as "En los paredones de las faldas E. y. O. de la Sierra de Casas situada al O. de Nueva Gerona en Isla de Pinos," probably as a direct result of Gundlach's own collecting. Crosse[6] repeats the last named habitat.

[1] Morelet: Rev. Zool., p. 144, 1847.
[2] Poey: Mem. Cuba, I, p. 116, t. 5, fig. 15-17, 1851.
[3] Todd: Ann. Carnegie Mus., vol. X, pl. XXVII.
[4] Pfeiffer: Mon. Pneum., I, p. 334, 1852.
[5] Arango: Contribucion a la Fauna Malacologica Cubana, p. 45, 1878.
[6] Crosse: J. de Conch., vol. 38, p. 310, 1890.

The true habitat of *Priotrochatella constellata* is the *northern* portion of the Sierra de Casas, that of *P. stellata* the Sierra de Caballos and possibly in its northern extension now called the Sierra de Columbus. I do not know of any records of either species being found on the opposite side of the river from its true habitat. Due to the fact that *P. torrei* does not possess a rapidly descending ultimate whorl, as in *P. constellata*, therefore lacking that species' pagoda-form appearance, one would be inclined to suppose that it is most closely related to *P. stellata*, in spite of its habitat in that region theoretically occupied only by *P. constellata*. Admitting as a possible premise that *P. constellata* and *P. stellata* are derivatives of a common ancestor; that due to separation on opposite sides of the river Sierra de Casas, the two species have assumed characters rendering them specifically distinct, there are then several possible explanations of the origin of *P. torrei*. 1. A direct descent from the original *Priotrochatella* stock isolated by geographical change in its own particular habitat at approximately the same period as *P. constellata* and *P. stellata*. 2. A more recent geographical separation from either *P. stellata* or *P. constellata*. In an attempt to throw some light on this question I have examined the radulae of three specimens of each of the three species of *Priotrochatella*. That too much stress must not be placed on the value of the radula as an important character in deciding specific values has been repeatedly demonstrated. I nevertheless believe that sufficient differences appear in the radulae of the species mentioned to furnish some foundation for my belief that *P. torrei*, in spite of its outward similarity to *stellata*, is probably more closely related to *constellata*.

The name *Priotrochatella* was given as a subgenus by Crosse[7] to those species of *Eutrochatella* possessing an operculum similar to that of *constellata*. Wagner[8] raises *Priotrochatella* to a genus and includes the species *constellata* Mor. and *stellata* Vel. As far as I know no figures of the radulae of *Priotrochatella* have been published.

[7] Crosse: J. de Conch., vol. 41, p. 88, 1893.

[8] Wagner: Denkschriften Akad. Wissenschaften. Band LXXVII, p. 369, 1905.

The radula of *P. torrei* is approximately 14.5 mm. long, and 1 mm. wide, and contains in the vicinity of 250 rows of teeth. The central tooth and the four laterals on each side are perpendicular to the long axis of the radula, the rest of the row comprised of approximately 100 uncini, curves back toward the posterior end of the radula. The central tooth (pl. 4, fig. 1, c.) has a very slight cusp at its summit. The laterals (i, ii, iii) possess very strong cusps which are not denticulate. The major lateral (iv) cannot be described as denticulate, the cutting edge being merely slightly sinuous. In this respect the radula of *Priotrochatella* differs from that of any of the other Helicinidae. If this major lateral is composed of two teeth, they are so firmly interlocked that I have been unable to separate them. The uncini (Fig. 1, u) (Fig. 2) are numerous and densely packed. The innermost (1, 2) are simple, possessing but one cutting edge, later (38, 39) becoming bidentate. In the 45th (45) tooth of the radula figured, the inner denticle is again divided, and the increase in the number of denticles continues to about the 98th row where the cusp is twelve-denticled. The curve of the outer edge of the radula causes the cutting edge of the outermost uncini to be turned inward toward the center of the radula and parallel to its long axis. The three or four outermost uncini are very broad flat plates and the denticles entirely disappear.

The radulae of *P. constellata* and *P. stellata* are very similar to that of *torrei* excepting in the central teeth. In *P. stellata* (Fig. 4) the central tooth is large, with a very strong broad cusp. In *P. constellata* (Fig. 3) and in *P. torrei* the central teeth are very similar in size, differing only in the shape of a very small cusp. There do not seem to be any constant differences in the radulae of the *Priotrochatella* excepting in the central teeth.

Summary (1). The radulae of the three species of *Priotrochatella* exhibit sufficient differences in structure from other groups of Helicinidae to sustain the raising of *Priotrochatella* to generic rank.

Summary (2). The similarity of the radula of *P. torrei* to that of *P. constellata* is of sufficient importance to lend consider-

able weight to a theory that *P. torrei* is more closely related to *P. constellata* than to *P. stellata.*

EXPLANATION OF FIGURES, PLATE 4.

All figures were drawn with the aid of a camera lucida.

Fig. 1. *P. torrei:* c. central; i, iv laterals; u. uncini.

Fig. 2. Uncini 1 and 2, 38 and 39, 45, 55, 70, 90, 102 (the outermost).

Fig. 3. Central tooth of *P. constellata.*

Fig. 4. Central tooth of *P. stellata.*

Figs. 5, 6, shell of *P. torrei.*

LAMPSILIS VENTRICOSA COHONGORONTA IN THE POTOMAC VALLEY.

BY WM. B. MARSHALL.

In the NAUTILUS for October, 1917, I recorded the finding of two valves (belonging to the same individual) of this shell by Manly D. Barber in the Potomac River, at Great Falls, Maryland, about eighteen miles above Washington, D. C. Dr. Ortmann had already recorded the finding of a single specimen as far south as the Shenandoah River, at Harper's Ferry, W. Va., some fifty miles above Great Falls, and the finding of others at places farther up the river.

On July 7, 1918, Dr. C. Wythe Cooke of the U. S. Geological Survey, found a superb specimen living in a sandy pass at Midriver Island, which is only about a mile and a half above the Falls.

On July 28, 1918, he and I donned bathing suits and made a careful examination of the spot in the hope of finding more specimens, and especially the very young. For two or three hours we explored the sand and the mud beneath with our fingers and toes and passed quantities of sand and mud through our hands and through a fine mesh sieve. The spot thus investigated was about 20 feet wide and 75 feet long. Our efforts were rewarded by the finding of four specimens of *cohongoronta*, the smallest having a length of 40 mm., the largest a length of

72 mm. The specimen found by Dr. Cooke on July 7th had a length of 90 mm. Their occurrence thus in a colony and of different ages establishes *cohongoronta* as a member of the naiad fauna of that vicinity. That the locality is well fitted for them is shown by the great beauty of the specimens, which are highly polished, much rayed with dark green on a ground color varying from yellowish-olive to light green and to very dark brownish-olive. The shells are perfect except for a slight erosion of the beaks. The posterior ridge is high and fairly sharp. The angle at the junction of the posterior and ventral margins is prominent.

Other naiads found at the same station were *Lampsilis cariosa* (9), *Strophitus edentulus undulatus* (1), *Symphynota viridis* (1 dead), *Alasmidonta undulata* (2), *Margaritana marginata* (6), *Unio complanatus* (many), *Unio productus* (many).

Until the present time *Unio productus* and *Unio fisherianus* have been the only naiads in this vicinity which have offered any great difficulty in identification. They are not yet well understood. Further study may show that they belong to the same species or, on the other hand, it may bring to light characters which will more surely differentiate them. *Lampsilis cariosa* and *L. ochracea* have been confusing to some students. Simpson[1] has pointed out the differences between them. To me very rarely have they offered any difficulty. The coming of *cohongoronta* into this neighborhood may probably lead to problems in future times. With passing time this shell, in accommodating itself to new surroundings, may be modified in form and color, and these modifications may trend in the direction of *cariosa*, making it difficult to distinguish between the two species. Whence *cariosa* came and how and why it came we have no positive knowledge, but it has been here since prehistoric times and its make-up must be well established and best suited to its environment. We hardly may expect any great change in this species. *Cohongoronta* is a new arrival. It may find conditions here approximately like those in its an-

[1] Nautilus, VIII, pp. 121-123, 1895. Both species are figured, but the legends beneath the figures should be transposed.

cestral home, but it is more probable that it will find some conditions different. Environment will not make a change to suit the mollusk and hence if its residence is not to its liking the naiad will have to adapt itself to the residence or else retire from the field.

Then, too, there is a possibility that the two species will hybridize and produce one or more other forms or races. Hybridizing might wipe out either *cariosa* or *cohongoronta*, or it might wipe out both of them, replacing them by a race of mixed blood. Bearing a resemblance to each other close enough to suggest a common ancestry or a converging development and living now side by side in the same spot, it seems to the writer that a crossing of the two species will be not only possible but highly probable. Indeed, one of the specimens of *cohongoronta* collected in that spot may be a hybrid. Its anterior portion has the glossy, peculiar straw-colored periostracum of *cariosa*, while the other features of the shell are distinctly those of *cohongoronta*. It will be interesting and profitable to note the future history of the two species in this vicinity, especially as the specimens of *cohongoronta* in the U. S. National Museum (Cat. Nos. 219057 and 219058) will show the characters of the shell at the time of its first arrival and form a basis of comparison with the shells of future generations. The specimens of *cariosa* collected at the same time and place form catalogue number 219059.

THE STATUS OF LOBOA BRUNOI VON IHERING.

BY PAUL BARTSCH.

In the "Nautilus" for February, 1917, vol. 30, on pl. 4, fig. 7, and in the number for March, 1917, pp. 121-122, Dr. H. von Ihering describes a new genus and species of landshell from the Island of Trinidad, as *Loboa brunoi*.

During a recent visit to Washington, Dr. Carlos Moreira, of Brazil, submitted a shell to me for determination. This specimen, which is in a subfossil state, also came from the Island

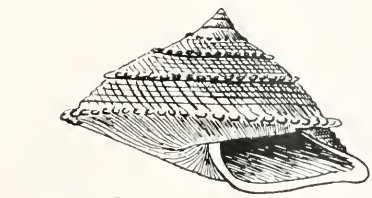
of Trinidad, off the coast of Brazil, in approximately latitude 21° S., longitude 29° W. Comparing it with the description published by Dr. von Ihering, I feel certain that it is the species described by him. In fact, I am not altogether sure but what this may be the same specimen described by Dr. von Ihering.

Unfortunately, the figure cited above is a mere outline figure, and rather poor at that, so much so in fact that one would not recognize the present shell were its status dependent upon the figure alone, but the description is positive. The rareness and isolated distribution of this species justifies rediagnosis and a good photographic figure, which are here presented. The shell will have to be known as *Bulimulus* (*Protoglyptus*) *brunoi* von Ihering (Plate IV, fig. 7).

Shell very elongate-ovate, dingy white. The nepionic portion consists of not quite one turn, which is well rounded, and marked by slender, slightly protractively slanting axial riblets. The succeeding turns are well rounded, appressed at the summit, and separated by a somewhat constricted suture. They are marked by almost rib-like, decidedly retractively curved incremental elements and slender spiral lirations, the junctions of which form feeble tubercles. Base somewhat prolonged, moderately rounded, very narrowly perforated, marked by the continuation of the rib-like elements and spiral lirations, both of which agree in strength with those on the spire, but becoming more crowded on the anterior portion of the base. Aperture oval; posterior angle acute (outer lip fractured at the edge); inner lip slightly sinuous and narrowly reflected; parietal wall covered by a moderately thick callus.

The specimen, which may be the type, belongs to the National Museum of Brazil. It has 7.3 whorls, and measures: altitude, 19.5 mm.; greater diameter, 8.3 mm.

JOHNSON: FUNDELLA CANDEANA D'ORBIGNY



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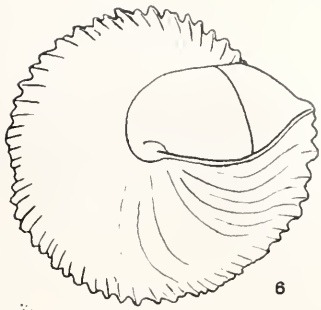

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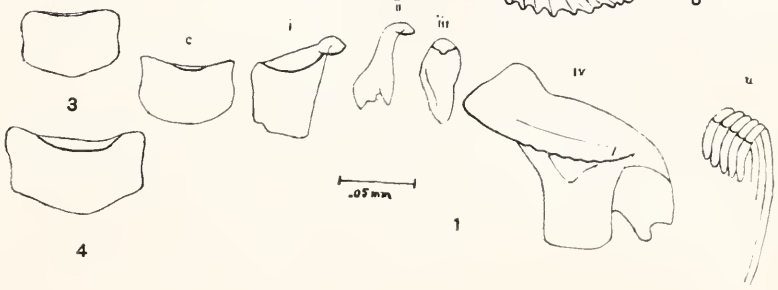
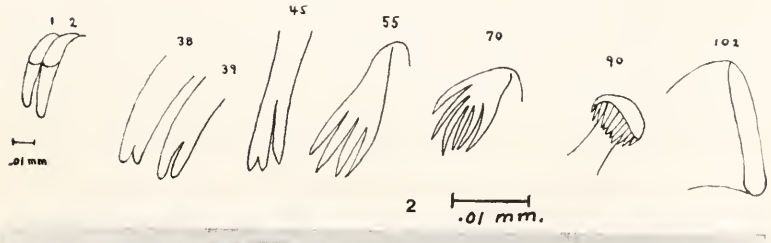
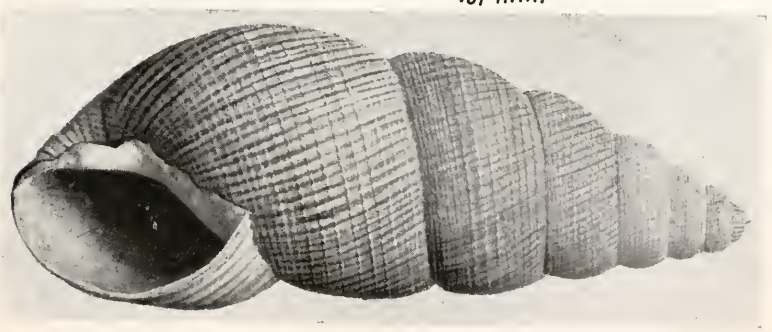






7

1–6. W. F. CLAPP: A NEW PRIOTROCHATELLA.
7. PAUL BARTSCH: BULIMULUS (PROTOGLYPTUS) BRUNOI × 5.

HELIX AREOLATA.

BY C. R. ORCUTT.

The month of March, 1917, was spent by the writer almost entirely on Magdalena Island, Baja California, Mexico. One day was spent on Santa Margarita Island, separated from Magdalena Island by a channel about ten miles wide, which serves as the main entrance to Magdalena bay to-day, which can be entered, though by small boats, by the two other channels north and south which separate these islands from the peninsula. By dropping the "Santa," as is often done in conversation, we have "Margarita Island," so often mentioned in shell literature, which in turn lent its name to the bay which it helps to protect—hence "Margarita bay," where W. Harper Pease had collected for him seventy-four species of mollusks, as reported by Carpenter.

The industry in orchilla (*Roccella tinctoria*), for dye-stuff, that was developed about forty years ago, when, I am told, as much as a million dollars worth of this lichen was exported to Germany around the Horn in a single year, led to the present settlement on Magdalena Island. Mining for magnesite has now led to another settlement on Santa Margarita Island in recent years, though it seems probable that this settlement really antedated that on Magdalena Island.

Helix areolata was the only land shell reported by Carpenter from Margarita bay in the Pease collection. In vain I searched for the Pupas, found so abundantly further north at San Quintin bay in 1886, on *Roccella tinctoria*, but I doubt not these may yet be found in the vicinity of the bay, on the peninsula if not on the islands, by some more persistent observer upon more thorough exploration of the bay shores. One specimen, not at hand, that may have been *Assiminea californica*, two dead specimens of *Pedipes* (probably *P. liratus*), and numerous living *Melampus olivaceus* were found.

Pilsbry is no doubt right in taking Magdalena bay as the type locality for *Helix areolata* (see Proc. Phil. Acad. 1913, 391), but I would select Santa Margarita Island as probably the exact location.

I would select the same island as the type locality of *Helix pandorae*, credited by Dall to "Margarita Island," I believe, though Pilsbry selects the San Benito Islands, to the northwest of Cedros Island, instead.

Pilsbry selects San Bartolome bay, on the peninsula, as the type locality of *Helix levis*, but it seems to me that Santa Margarita Island could be selected with equal propriety, and this would give us these three "species" as from one "type locality." It can never be exactly known where these types were actually collected, so that any designation of a type locality must be more or less arbitrary.

My series of *Helix areolata* was all collected on Magdalena Island, in a space perhaps a mile square, extending from the ocean to the bay. The species was not confined to this area by any means, and probably occurs in equal abundance over the entire region around Magdalena bay. In places the ground is white with the dead shells, and millions may be found drifting in the adjacent sand hills on Magdalena Island.

The scant desert vegetation, such as agave, fouquiera, and other plants, often harbored considerable colonies of living snails. The shells on the bushes would often be found in the morning covered with sand, indicating that they burrow in the soil, probably climbing the plants for feeding purposes and some staying over time. All my specimens were obtained from the plants, however, and not by digging. I doubt not that every figure on Pilsbry's two plates (Proc. Phil. Acad. 1913, plants 15 and 16, figs. 1 to 52) could be matched by specimens living in the area of the square mile referred to.

Many specimens were a solid chalky white, with no trace of bands or color. Some have a strongly developed tooth; most of the individuals show no trace of one. Some specimens, old and mature, but usually rather small, were of a uniform pale olivaceous-brown color, without signs of bands or other color, that would answer well for Binney's figure of *Helix pandorae*. Some individuals were as elevated as *Helix veatchii* is figured as being, and other shells are nearly as depressed as *Helix Traskii*. Young individuals would answer for Pfeiffer's figures of *Helix decorata* or *H. levis*.

A colony of these snails, on leafy shrubs growing on sand hills near the ocean, supplied the smallest individuals. Snails on salicornia and other plants providing abundant shade furnished perhaps the largest number of solid white shells.

Midway between the ocean and the bay, on an exposed plateau, I found the largest number of highly-colored shells, many immature or just come to maturity, on leafless plants like fouquiera, where the variegated color was an excellent protection. It was very difficult to see these snails on the bushes, even near at hand, except as projecting knobs on the stems against a background of sky.

The usually chalky-white shell seems to have a chocolate-brown epidermis, which varies in intensity at different stages of its growth, often nearly or quite absent, thus producing the irregularly interrupted and very variable bands. This colored stratum is thin and can be worn away with a knife-blade without injury to the shell, and in age seems to naturally but irregularly wear away, producing as many designs as there are individuals.

I have collected thousands of specimens called *Helix levis* at San Quintin bay, at the Rosario mission some eighty miles southward, and on the peninsula east of Cedros Island, which seem to me to only differ from the Magdalena Island shells in size. All these localities are arid; rains occur at irregular periods, sometimes three years or more apart, but copious fogs from the sea nightly refresh the vegetation.

Pilsbry speaks of the known areas of *levis* and *areolata* as separated by a "long reach of coast whence no land snails are known." From Turtle bay (a portion of, and not synonymous with San Bartolome bay, as I am told) to Magdalena bay is an arid coast unexplored by naturalists, from the lack of water and landing places, mainly unknown because overland trails traverse this portion of the peninsula away from the sea. But there is no reason to doubt the presence of this snail in some form through the entire region from San Quintin bay to Cape San Lucas.

I presume that the older naturalists, like many modern naturalists, collected sparingly, but selected specimens show-

ing the extreme variations. These were usually described by other naturalists, not the collectors, who based upon them as many species as they had individuals, through ignorance rather than intent. In conclusion, therefore, I would express agreement with the opinion of the late Dr. R. E. C. Stearns, who said (in N. Y. Acad. Ann., 2:136) that he regarded "*H. areolata, pandorae, veatchii* and *levis* as varieties of a single species." Pfeiffer's *H. decorata* may evidently be added to the long list of synonymy. Doubtless more than a hundred varietal names may consistently be given to the various insular and peninsular forms occurring between San Quintin bay and Cape San Lucas when the whole region is fully explored.

SOME PHILIPPINE SNAILS.

BY T. D. A. COCKERELL.

My friend and former student, Dr. Cipriana Subejano, returning from the Philippine Islands, kindly brought a number of living snails collected by Mr. Maximo Oro at Los Baños, Luzon. We have now had them alive for many weeks in glass bowls, feeding them on cabbage, lettuce and sliced apples. Some have died, but three of the immense *Rhysota ovum*, four *Cochlostyla metaformis* and one *C. rufogastra* still remain in good health. The following notes may be of interest; but I have not access to the large works of Semper, Hidalgo, etc., and do not know how far the observations are new.

Rhysota ovum Val.

When giving us the snails Miss Subejano stated that these emitted a cry at times, resembling that of a young child or small animal. For some time we wondered what she could have heard, but at length the snails favored us with several separate performances. The cry, a plaintive, high-pitched note, is produced as the snail contracts into the shell, and is due to the emission of air. It is very distinctive, but is only occasionally noticed. The habits of *R. ovum* are very different from

those of the species of *Cochlostyla*. It appears to be nocturnal, and is very inactive. Never once has it been seen stretched at full length. The animal is a remarkable creature. The mantle is whitish, and the lung is extremely capacious, with a wide orifice. The foot above is white, with a large caudal mucus gland. Anterior three-fifths of sole pale brownish-grey, the posterior two-fifths dull white, contrasting. Head blackish; oculiferous tentacles blackish, stout basally, eye-bulb pale ochreous; lower tentacles white at end, with the bulb pale ochreous. The shell has a diameter of about 75 mm.

Cochlostyla rufogastra Less.

Kindly determined by Dr. Bartsch, who states that it belongs to the typical subspecies. In both the species of *Cochlostyla* the foot is emarginate anteriorly, but in other respects the animals of the two present marked differences. *C. rufogastra* has the mantle black; and the very broad sole plumbeous in the middle, with the lateral areas (not so wide as the middle one) black; the extreme edge of the sole is narrowly reddish. The body above and on the sides is reddish-brown, with the conspicuous rugæ darker; the dorsum is strongly blackened. The eye-bearing tentacles are very long. A couple of these snails mated, and later one laid a great quantity of eggs, which, however, did not develop. The eggs are spherical, soft, opaque white, with a diameter of 7 mm.

Cochlostyla metaformis Fér.

A much smaller species than the last, with a pale-colored shell. There are two varieties, one banded, the other bandless; the soft parts are the same in both. The species was identified by comparison with a specimen determined by Dr. Bartsch. The oculiferous tentacles are very long, 24 mm.; head rather elongated, lower tentacles about 5 mm. from base of eye-bearing ones. Body anteriorly pale greyish-brown, tentacles reddish; posteriorly the body is pale grey dorsally, the sides of the foot washed with ochreous; mantle light reddish ochreous. The sole is light ochreous, without longitudinal zones differentiated by color, but the margin is suffusedly a little darker. Both species of *Cochlostyla* are quite active by daylight.

THE NOMENCLATURE AND SYSTEMATIC POSITIONS OF SOME NORTH AMERICAN FOSSIL AND RECENT MOLLUSKS.

BY JUNIUS HENDERSON.

Pholadomya undata Meek and Hayden (Proc. Acad. Nat. Sci., Phila., VIII, 1856, p. 81), now generally known as *Liopistha* (*Cymella*) *undata*, Cretaceous, Rocky Mountain region, is preoccupied by *P. undata* Dana (Wilkes U. S. Expl. Exped., X, 1849, p. 687, Atlas, Pl. 2, figs. 11, 11 a, 11 b), Carboniferous, Australia. It is unfortunate to have to abandon Meek and Hayden's name for the well-known American species, but the rules of nomenclature require it, so I propose the name *Liopistha* (*Cymella*) *montanensis*, in reference to both the type locality and the geological group from which it was described.

Anodonta parallela White, was described from the Cretaceous of Colorado in 1878 (Hayden Survey, IV, p. 709). Binney used the same name in his Bibliography of North American Conchology, Pt. I, 1863, p. 46, citing Ferussac, "Hyde, in litt." As neither Ferussac nor Binney, so far as I know, ever published any description to accompany that name, White's name will stand.

Unio rectoides White, Tertiary, Utah (U. S. Geol. Surv., Bull. 34, 1886, pp. 11, 15, 21), is preoccupied by *U. rectoides* Whitfield, "Cretaceous," New Jersey (U. S. Geol. Surv., Monog., Vol. 9, 1885, pp. 250, 258). As Pilsbry and others have shown, Whitfield's *rectoides* is itself a synonym of *Lampsilis recta* (Lam.), and is from Quaternary deposits, instead of Cretaceous. Under the circumstances it seems too bad to abandon White's name, but the rules adopted in the interest of ultimate stability of nomenclature require it. I propose for it the name *Unio whitei*. It should likely be removed to some other genus.

Unio browni Whitfield, Cretaceous, Montana (Bull. Am. Mus. Nat. Hist., XIX, 1903, p. 485), is preoccupied by *U. brownii* Lea, recent, Asia (Proc. Acad. Nat. Sci., VIII, 1856, p. 95), so Pilsbry renamed it *Parreysia barnumi* (Nautilus, XVIII, 1904, p. 12), a fact that seems to have been overlooked by subsequent writers, which is likely to be the case where new names

are proposed in brief notices of publications in reviews. Even if Conrad's Africo-Asiatic genus *Parreysia* is to be considered valid, the reference to it of Whitfield's species seems to me incorrect. In the present unsettled condition of the classification and nomenclature of recent Unionidæ, it is doubtful whether any good purpose is served by removing the fossil forms from the genus *Unio*, though perhaps few, if any, would be placed there if we had sufficient knowledge of the family, and had the anatomy and perfect shells with which to work.

Melania (*Goniobasis?*) *sculptilis* Meek, Tertiary, Hot Springs Mts., "Idaho" [Nevada] (Proc. Acad. Nat. Sci., Phila., XXII, 1870, p. 58), is preoccupied by *Melania sculptilis* Lea, recent, Tennessee (Transac. Philos. Soc., X, 1853, p. 297; Tryon, L. & F.-W. Shells, Pt. 1, 1873, p. 297), so Meek's name must be abandoned, but I refrain from renaming it until further investigation, for the following reasons: Meek himself later expressed a doubt as to whether *sculptilis* and *subsculptilis*, from the same locality and position, are distinct, and also suggested that it is not distinct from *M. taylori* Gabb. Furthermore, Dr. T. W. Stanton informs me that on Meek's separate copy of his paper in which *sculptilis* and *subsculptilis* are described is the following penciled note in Meek' s handwriting: " Prob. the same named *M. decurata* Con. Am. Jour. Conch. 6, p. 200, Ap. 1871, and both are prob. synonyms of a species descr. by Gabb in Cal. Report." The reference to Conrad's *decurata* probably means *decursa*, which is said to have come from Colorado. The figure does not look like any of the species mentioned. Gabb's species to which he refers is *M. taylori* (Paleont. Cali., II, 1869, p. 13, Pl. 2, fig. 21), the figure of which is much more slender than Meek's figures, but perhaps because drawn from a more mature specimen, as Meek suggests. If Meek's *M. sculptilis* is the same as any or all of the other three, then no new name is needed. I believe it is identical with *subsculptilis*.

Melania convexa var. *impressa* Meek and Hayden, "Tertiary" [Cretaceous], Montana (Proc. Acad. Nat. Sci., Phila., IX, 1857, p. 138), is preoccupied by *Melania impressa* Lea (Proc. Philos. Soc., II, 1841, p. 83; Transac., IX, p. 19; Obs., IV, p. 19). Hence Meek and Hayden's name must be abandoned,

but as their *impressa* is probably not sufficiently distinct irom their *convexa* to deserve a name, I propose the use of that name *convexa*, and do not rename it. Probably all should be referred to *Goniobasis*, as is usually done.

Cerithium tenerum Hall was described from the western Tertiary in 1845 (Fremont's Expl. Exped., Ore. & Cali., p. 308, Pl. 3, fig. 6), and was transferred to *Goniobasis* by Meek in 1870. Meantime, *Melania tenera* Anthony, was published by Reeve in 1861 (Monog. *Melania*, sp. 407), and was transferred to *Goniobasis* by Tryon in 1872 (L. & F.-W. Shells, Pt. 1, p. 264). This gives Hall's species priority, and Anthony's should be renamed unless it has already been renamed or is considered a synonym of something else. A revision of the group including *G. tenera* Anth., based upon adequate material, is desirable.

Melania multistriata Meek and Hayden, now known as *Campeloma multistriata*, was described in 1856 from the Fort Union Tertiary (Proc. Acad. Nat. Sci., Phila., VIII, 1856, p. 124). Wheatley used the same name in 1845, attributing it to Lea (Cat. of Shells of U. S., p. 147). His catalogue was a list, without descriptions, and I do not find that Lea or anyone else ever used that specific name in either *Melania* or *Campeloma*. Hence Meek and Hayden's name should stand. Dr. Pilsbry writes that he finds no specimens bearing such a name in Wheatley's collection in the Academy of Natural Sciences at Philadelphia. Dr. Bryant Walker, in a letter just received, says: "Neither Wheatley nor Lea ever described a species as *Melania multistriata*. The use of that name by both of them seems to be owing to a *lapsus calami* of Lea, who in his remarks on his *M. buddii* compared it with 'the striate variety of Mr. Say's *virginica*, which he called *multistriata*.' Say's species was *M. multilineata*, and Tryon makes the correction on p. 295 of his monograph."

Paludina multilineata Meek and Hayden, Fort Union Tertiary, Fort Clarke, North Dakota, was described in 1856 (Proc. Acad. Nat. Sci., Phila., VIII, p. 120), and renamed by the same authors *Viviparus nebrascensis* (Proc. Acad. Nat. Sci., Phila., XII, 1860, p. 430), because they said *multilineata* was preoccupied in *Paludina* by Say, 1829. Later, after the Meek and

Hayden species had been removed to *Campeloma*, Meek restored the first name, calling it *Campeloma multilineata*, in accordance with his custom, a practice forbidden by modern rules of nomenclature. Since then, everyone has followed Meek. A difficult question as to what constitutes a description is involved, but I believe the second specific name should be used and that the name should be written *Campeloma nebrascensis* (Meek and Hayden). Say's *Paludina multilineata*, now placed in *Viviparus*, was described after a fashion by indicating the species to which he referred. He says: "I described it nearly four years since under the name *multilineata* [evidently in unpublished manuscript]; but recently, being about to publish it, on a more attentive examination and comparison with a specimen of the *elongata* from Calcutta, I have concluded that it varies from that specimen only in having the umbilicus a little smaller." Tryon, after quoting this, says: "I have compared the original specimen with shells from Calcutta, and find that it differs as little from them, as they do from each other. It is smaller than the foreign specimens, but I think a larger native shell was mislaid, or placed accidentally among the foreign ones, in the same collection; so that, rather than commit an error, I have chosen the reputed American example for my illustration. If this is not the *bengelensis* of Lamarck, it must have the name given to it by Say; that of Swainson [*elongata*] having been previously given to a fossil species." It is plain then, that the name *multilineata* was definitely applied to the Florida species by both Say and Tryon, provided it proved distinct from the Asiatic species, which it probably is, and the designation was accompanied by a figure of the Florida species and a brief description by comparison with the Asiatic species. All this appears to me to preclude the use of the name *multilineata* for Meek and Hayden's species.

Helix occidentalis Meek and Hayden, Judith River, Cretaceous, Montana, is another instance of the same kind. The name was changed by Meek to *nebrascensis*, because *occidentalis* was preoccupied in *Helix* by Recluz. Then Meek, in removing the Cretaceous species to *Hyalina*, restored the original name, in accordance with his custom, but contrary to present usage. From

the figures it is impossible to definitely ascertain to what genus either this species or *H. evansi* M. & H., from the same locality and formation, belong, but whatever the genus, the name *occidentalis* should not be used. As to *H. evansi*, which is based upon poor and probably immature material, we agree with Dr. Pilsbry, who writes: "It is better to leave uncertain shells of this kind in '*Helix*,' as uncertain generic reference may lead some one to baseless deductions. Paleontology is full of the most reckless generic references." He also calls attention to the fact that *H. occidentalis* Recluz, is now considered a *Hygromia*, ranking as a variety, but that does not restore Meek and Hayden's first name for their species.

Planorbis vetulus Meek and Hayden, was described from the Tertiary of South Dakota in 1860 (Proc. Acad. Nat. Sci., Phila., XII, pp. 175, 431). In 1864 (Smithsonian Check-list of Invertebrate Fossils of North America—Miocene, p. 13) Meek called it *P. vetustus*, since which time the latter name has been almost universally used, though no reason was given for the change. The change was likely inadvertent, though possibly deliberate, as authors in those days did not always hesitate about changing names to suit their own notions. Unless *vetulus* is preoccupied, of which I have found no evidence, it must stand as the name for this species.

A somewhat similar case is that of *Campeloma vetula* Meek and Hayden, which was first described as *Paludina vetula*, and afterwards cited by the same authors as *P. vetusta* and changed to *Vivipara vetusta*, but fortunately in that case the original name has been used by most subsequent authors, though White (U. S. Geol. Surv., Bull. 128, p. 77) made the curious mistake of supposing that *V. vetusta* and *C. vetula* are distinct species.

Limnæa tenuicosta Meek and Hayden, Eocene, near Fort Union, N. D., was described in 1856 (Proc. Acad. Nat. Sci., Phila., VIII, p. 119). In 1860 the same authors (Proc. Acad. Nat. Sci., Phila., XII, p. 431) cited the original description but spelled the name *tenuicostata*, without offering any reason, and the majority of subsequent writers have used the latter name, instead of the former.

NOTES ON THE MOLLUSCA OF FORRESTER ISLAND, ALASKA.

BY GEORGE WILLETT.

During the past four months (1914 to 1917 inclusive), which were spent by the writer on Forrester Island, Alaska, some attention was given to the study of the mollusca of the locality. The shore line was rather thoroughly traversed and some dredging was done in various depths down to seventy-five fathoms.

Forrester Island lies well out to sea, a few miles north of the Canadian boundary line. It is about fifteen miles west of Dall Island, and seventy-five miles out from the mainland shore. The island is small, being approximately five miles in length and from a half mile to a mile and a half in width. It is very rocky along shore but is well timbered from the high-water line to the summits of the hills. There are a number of small islets and groups of rocks lying off the main island and practically all of these were visited one or more times.

As Forrester Island is well within the sweep of the Japan current, the water is much warmer than in the inside channels around Dall and Prince of Wales islands. The effect of this difference in temperature is shown in the fact that several species of shells that occur in 10–15 fathoms in inside waters were not found in less than 40–50 fathoms at Forrester Island. Also a number of species that were rather common on Dall and Prince of Wales islands were not noted on Forrester Island at all. As there are neither sand beaches nor mud flats on the island, many forms requiring such situations were conspicuously absent. The tidal currents in the vicinity are very strong at times, and it is quite possible that some species of which fragments or dead shells were found do not properly belong to the island fauna but were carried to the locality by the strong currents. One of the most interesting features of this region from a conchological standpoint is the fact that in many instances it seems to be a meeting point between boreal species and those from the southern fauna.

A number of species taken have since been described as new. In such cases I have mentioned the paper in which the descrip-

tion was given. The chitons obtained were made the subject of a paper by Dr. S. S. Berry in the Proceedings of the California Academy of Sciences (Fourth Series, Vol. VII, No. 10, September 1, 1917, pp. 229–248). All species of which I was doubtful as to identity were submitted to Dr. Wm. H. Dall and named by him. For this kind assistance I wish to express here my very great appreciation.

The following is a list of species of bivalves taken with brief notes on same:

Terebratulina caput-serpentis Linn. Several young specimens dredged in 50–60 fathoms.

Terebratalia transversa Sby. Common 5–30 fathoms.

Laqueus jeffreysi Dall. Abundant in 65–75 fathoms.

Nucula tenuis Mont. Rare. One or two dead valves and one living young specimen dredged.

Nucula (*Acila*) *castrensis* Hds. Common 40–50 fathoms. At Waterfall, Prince of Wales Island, plentiful in 10 fathoms.

Leda minuta Fabr. Fairly common 20–40 fathoms.

Leda penderi Dall. One dead valve dredged. Rather common at Waterfall in 10 fathoms.

Leda fossa Baird. A few dead valves dredged in 75 fathoms.

Glycymeris septentrionalis Midd. Rather uncommon.

Glycymeris corteziana Dall. Abundant 20–40 fathoms.

Glycymeris migueliana Dall. Fairly common 20–40 fathoms.

Philobrya setosa Cpr. Fairly common.

Pecten (*Chlamys*) *hericeus* Gld. Found occasionally.

Pecten (*Chlamys*) *hindsi* Cpr. Abundant from low-tide line to 60 fathoms.

Pecten (*Chlamys*) *islandicus* Mull. A few specimens taken in dredge with last species.

Pecten (*Chlamys*) *caurinus* Gld. Single dead valve dredged.

Pecten (*Pseudamusium*) *randolphi* Dall. Two young specimens dredged in 50 fathoms.

Pecten (*Propeamusium*) *alaskense* Dall. Fairly common in 50–60 fathoms.

Hinnites giganteus Gray. Rather common. More abundant in inside channels.

Lima (*Limatula*) *subauriculata* Mont. Dead valves common 25–50 fathoms. Living specimens rarely taken.

Monia macroschisma Desh. Rather common.

Mytilus californianus Conr. Abundant. Some specimens attaining a length of nine or ten inches.

Modiolus modiolus Linn. Occasional. Abundant in inside waters.

Musculus niger Gray. *Musculus seminudus* Dall. A few specimens of each of these species were taken in about 30 fathoms.

Musculus laevigatus Gray. One or two dead valves dredged.

Musculus vernicosus Midd. Common at times in sea weed at extreme low tide mark.

Thracia curta. One dead valve dredged. Rather common at Waterfall in 12 fathoms.

Thracia challisiana Dall. A few dead specimens taken in 30–40 fathoms. Living specimens were probably all too deep in gravel to be secured by the dredge.

Pandora (*Kennerlyia*) *forresterensis* Willett. (NAUTILUS, xxxi, 1918, p. 134.) Abundant in 60–70 fathoms; less plentiful in more shallow water.

Pandora (*Kennerlyia*) *bilirata* Conr. Common 25–50 fathoms.

Lyonsia (*Entodesma*) *saxicola* Baird. Dredged rarely. Rather plentiful in inside waters.

Lyonsia (*Entodesma*) *inflata* Conr. One living specimen dredged in 50 fathoms.

Lyonsia striata Mont. Occasional 30–60 fathoms.

Mytilimeria nuttalli Conr. Fairly common.

Cuspidaria planetica Dall. Not rare 50–60 fathoms.

Astarte compacta Cpr. Abundant 25–60 fathoms.

Astarte willetti Dall. (NAUTILUS, xxxi, July, 1917, p. 10.) Abundant with the last species. Adults mostly found in the deeper water.

Astarte alaskensis Dall. Abundant in company with the last two. *A. esquimaulti* Baird, was found to occur plentifully in 10 fathoms at Waterfall, but was not noted at Forrester Island.

Venericardia crebricostata Krause. Rather common 20–50 fathoms.

Venericardia (*Miodontiscus*) *prolongata* Cpr. Rather common with the last.

Thyasira trisinuata polygona Jeff. A few valves dredged in 50–60 fathoms Also taken at north end of Dall Island.

Diplodonta orbella Gld. Rather common. Much less globose than California specimens.

Phacoides (*Lucinoma*) *annulatus* Rve. A few specimens dredged in 40–60 fathoms.

Phacoides (*Parvilucina*) *tenuisculptus* Cpr. Fairly common 25–50 fathoms.

Kellia laperousii Desh. Abundant in dead shells of *Marcia kennerlyi*.

Rochefortia tumida Cpr. A few valves dredged.

Cardium (*Cerastoderma*) *californiense* Desh. Abundant 10–40 fathoms.

Protocardia centifilosa richardsoni Whiteaves. Common 50–60 fathoms.

Saxidomus giganteus Desh. Dead valves found occasionally. Abundant in inside waters.

Marcia kennerlyi (Cpr.) Rve. Abundant 20–40 fathoms.

Marcia subdiaphana Cpr. Rather common 50–60 fathoms.

Paphia (*Protothaca*) *staminea* Conr. Occasional in gravel between boulders. Very abundant in inside waters.

Psephidea ovalis Dall. Common 15–40 fathoms.

Tellina (*Oudardia*) *buttoni* Dall. Rather common in 50 fathoms.

Tellina (*Angulus*) *carpenteri* Dall. Fairly common with last.

Tellina (*Moerella*) *salmonea* Cpr. One pair of dead valves dredged in 40 fathoms.

Macoma calcarea Gmel. A few immature specimens dredged in 50–60 fathoms.

Semele rubropicta Dall. Occasional 25–40 fathoms.

Psammobia (*Gobraeus*) *californica* Conr. Rather common.

Siliqua patula Dixon. One dead young specimen dredged. Common in inside waters.

Spisula (*Hemimactra*) *polynyma alaskana* Dall. Dead valves found occasionally. Common in mud flats on inside waters.

Mya truncata Linn. Fairly common.

Panope generosa Gld. Single valves dredged occasionally.

Panomya arctica Lam. A few specimens taken in 50–60 fathoms.

Panomya ampla Dall. Several dredged in 25–50 fathoms.

Saxicava arctica Linn. Common. Many living specimens found in dead shells of *Marcia kennerlyi*.

Saxicava pholadis Linn. Less plentiful than the last.

PUPLICATIONS RECEIVED.

A Check-list of the Marine Fauna of New South Wales, Part I, Mollusca. By Charles Hedley. (Suppl. Jour. Royal Soc. N. S. W., Vol. 51, 120 pp., 1917. Issued June, 1918.) A very useful and interesting paper. The list by T. Whitelegge, of Port Jackson invertebrata, published in 1889, contained 802 marine mollusca. The present catalogue contains over 1200 species. The list has been purified notably by eliminating a block of Atlantic species included by mistake in the Challenger series of 410 fathoms off Sydney. The author estimates that future research will recognize 2000 species from the waters of this State. The nomenclature is up to date and one notes many changes, and in the position of certain families some surprises. The following new genera are proposed: *Attenuata*, *Austrodrilla*, *Epideira*, *Etrema*, *Exomilus*, *Guraleus*, *Inquisitor*, *Hemidaphne*, *Macteola*, *Nepotilla*, *Provexillum* and *Scabrella*.—C. W. J.

Mollusca. By Charles Hedley. (Reprint from the Proc. Royal Geog. Soc. Australasia. S. Australian Branch, Session 1916–17, 21 pp., 1 pl., 1918.) A report on some mollusca collected in Western Australia by Dr. H. Basedow, adding about sixty species to the fauna of that State. The new species described and figured are: *Tellina piratica*, *Eucithara basedowi*, and an interesting fresh-water shell *Bulimus sisurnius*.

Report on the Cephalopoda Obtained by the F. I. S. "Endeavour" in the Great Australian Bight and Other Southern Australian Localities. By S. Stillman Berry. (Biol. Results of the Fishing Experiments carried on by the F. I. S. "Endeavour," 1909–14. Commonwealth of Australia, Dept. of Trade and Customs, Fisheries, Vol. IV, pt. 5, pp.

203–298, pls. 59–88, 1918.) A valuable contribution to our knowledge of the Cephalopods of that region. The material studied consisted of 104 specimens, representing 9 genera and 13 species. On the whole the material was in good condition, but the author can find little to commend the use of formalin in preserving Cephalopods, unless it be for some of the more delicate and transparent pelagic forms. Nine new species are described and figured and two new subgeneric names are proposed—*Austrossia*, a subgenus of *Rossia*, type *R. australis*, and *Teuthidiscus*, a subgenus of *Opisthoteuthis*, type *O. pluto*. The illustrations based on the preserved specimens themselves, which are apparently much contracted and distorted, often fail to convey as clear an idea of the animal in life as a good drawing.—C. W. J.

Fresh-water Biology. By Henry Baldwin Ward, Ph. D., and George Chandler Whipple, with the collaboration of a staff of specialists. Pp. viii + 1111. New York: John Wiley and Sons Inc., 1918. This work treats of all groups of fresh-water plants and animals. In each group (except the Bacteria and fishes) there is a comprehensive outline of the system arranged in the form of a key, so that any form in hand may be run down to its genus or subgenus with the least labor. Typical species in each genus are described and in most cases figured. The figures, of which there are 1547, appear to be admirably selected, and as a rule are well engraved. The chapter on mollusks, by Dr. Bryant Walker (pp. 957–1020, 144 figs.), forms an excellent introduction to this group, as the clear definitions and abundant figures carry the classification to subgenera. As most of the figures represent the more common forms, a large number of the species most likely to be encountered can be determined. The well-illustrated synopsis of Unionid groups will be especially useful. There is no other publication giving an up-to-date and complete classification of our fresh-water mollusks, the data being scattered in many books and periodicals.

The chapter on Conditions of Existence, by Prof. Victor E. Shelford, will be of value to collectors of fresh-water shells for

its clear though condensed exposition of modern methods of observation and study.

The typography of the volume is particularly agreeable. The work deserves and will doubtless have a wide circulation. —H. A. P.

NOTES.

Colorado Mollusk Notes.—The latest find in Colorado is a fine specimen of *Limax maximus* L., found out-of-doors by D. M. Andrews, the well-known botanist, in one of his nurseries at Boulder, under a board. As he has imported some plants from France, it is possible that it came from there.

Several years ago a few *Lymnæa auricularia* (L.) were reported from Colorado Springs. Lately G. B. Warner sent me about 200 dead shells of that species found by him on the shore of Dotson Reservoir near Fowler, which is in the same drainage basin as Colorado Springs.

Lymnæa hendersoni Baker, therefore known only from the type locality west of Fort Collins, has been found by Dr. M. M. Ellis in a small pool west of Louisville. Like the one at the type locality, the pool contains water during only a few months each year.—Junius Henderson.

Viviparus contectoides limi, new name for *V. c. compactus* Pils., Nautilus, Vol. 30, p. 42. Dr. Walker has kindly called my attention to the prior use of *compactus* in *Viviparus* (Kobelt, Syst. Conch. Cab., *Vivipara*, p. 113, 1906), and the name is accordingly changed.—H. A. Pilsbry.

Commandant Paul Dupuis, of the Belgian Army, and well known to malacologists for his useful papers upon the shells of the Belgian Congo, having been severely wounded, has been transferred to the garrison of Paris, where he is employing leisure time in zoological studies, particularly upon the chitons.

Gonave Island Shells.—The following species of land shells were collected by Dr. W. L. Abbott at La Mahotiere on the S. W. coast of Gonave Island, off the west coast of Hayti: *Pleurodonte semiaperta* v. Mart. (this is the same as *Helix gaskoini gonavensis* Crosse), *Cepolis loxodon* Pfr., *Urocoptis guigouana* Petit, *Gastrocopta pellucida* Pfr., *Chondropoma browniana* Weinld., *Alcadia gonavensis* Weinld., and *Trochatella brownia* Weinld.—E. G. Vanatta.

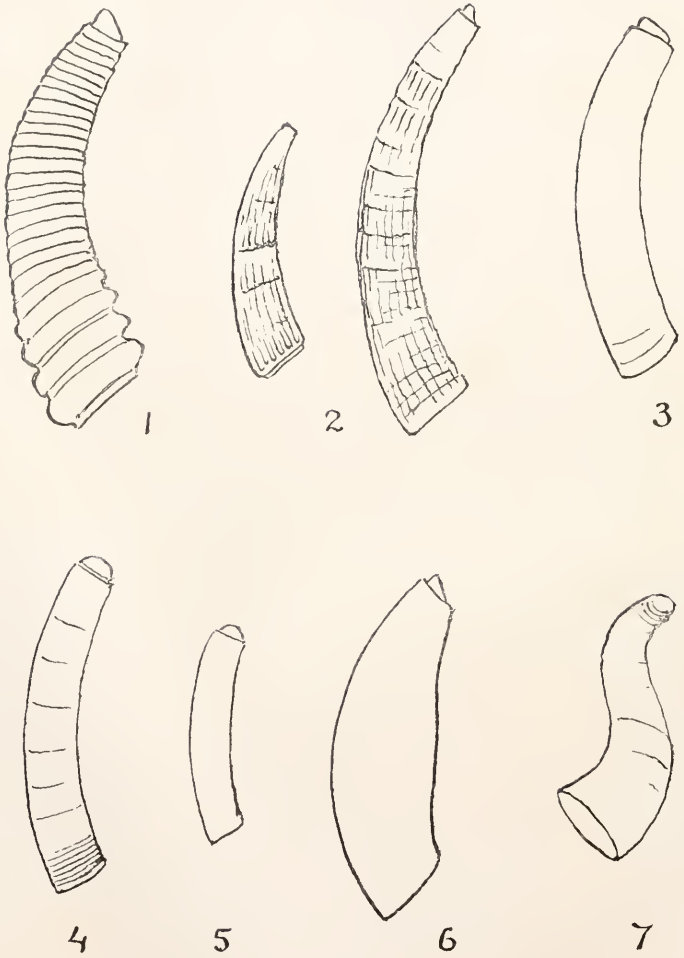
HENRY SUTER.

The well-known conchologist, Mr. Henry Suter, died at Christchurch, New Zealand, on July 30, 1918, at the advanced age of 77 years. He will be remembered best for his important work, the "Manual of New Zealand Mollusca," published in 1913.

Mr. Suter was a native of Zurich, Switzerland, and from his boyhood was an enthusiastic naturalist. He was educated as an analytical chemist and was engaged for several years in various commercial pursuits without much success. At last, to improve his prospects he emigrated with his family to New Zealand in 1887.

He commenced his colonial career by taking a farm in a rough bush district. When a middle-aged foreigner, accustomed to a town life, turns back-woodsman it is only in a novel that he ever succeeds. But when this last venture came to the inevitable end, Mr. Suter had fortunately attracted the attention of Capt. Hutton, who obtained scientific employment for him. Thereafter the remainder of his life was spent in the congenial work of zoology. He held no regular post, but was engaged in turn by various institutions to arrange collections, to make reports or as relieving officer.

So long did he continue in harness that he used finally to claim to be the oldest man in New Zealand earning, not drawing, government pay. His last occupation was the preparation of palaeontological bulletins for the geological survey.—Charles Hedley.



MORSE: NEW ENGLAND CAECUM.

THE NAUTILUS.

Vol. XXXII. JANUARY, 1919. No. 3

NEW FORMS OF CAECUM IN NEW ENGLAND.

BY EDWARD S. MORSE.

A few years ago I collected from several scoops of sand from Easton's Beach, Newport, R. I., over two hundred specimens of Caecum. From the variety of forms discovered, not including the three New England species[1] which were more or less abundant, one might imagine that the Marquis de Folin had been wrecked off the coast of New England at this place and his collection of Caecidae had been washed ashore. In de Folin's monograph of the group he says that the species vary greatly among themselves. The same species may vary from a smooth to a ribbed surface, not only that but the three sub-genera established by Carpenter[2] under the names of Elephantulum, Anellum and Fartulum are not based on permanent characters.

A reference to Carpenter's monograph of Caecidae shows that he gave little value to his groupings, for he says "The groups described under Caecum can scarcely be regarded even as sub-genera, so very gradually do they pass one into the other; but they are found convenient, to avoid the frequent repetition of characters, and to aid in the identification of species." He does not give a single illustration, which greatly diminishes the value of the monograph.

Bearing in mind this dictum of de Folin, one might believe that here is a distinct group of mollusks in which permanent

[1] *C. pulchellum*, Stimpson. *C. cooperii*, Smith. *C. johnsoni* Winkley.

[2] Proc. Zool. Soc. of London, 1858.

specific characters had not been established—nascent species, in fact. Marquis de Folin published a monograph of the family but I have never been able to refer to his memoir. So far as I can learn it is not to be found in any scientific library in the United States. Tryon in preparing his Manual of Conchology has been equally unfortunate. He was unable to obtain the memoir. Agents of the Philadelphia Academy of Sciences in Europe were specially instructed to obtain the work but without success.[1]

Tryon in his Manual presents two plates of figures of Caecum depicting thirty-nine species. I have compared my forms with these figures and under the names given have presented a few drawings of these forms which more or less resemble the figures as given by Tryon.

The family Caecidae consists for the most part of minute tubular shells from one to two millimeters in length. These shells are slightly curved backward. The earliest stage shows a closely coiled shell discoid in form ; after a few symmetrical whorls it abruptly straightens out into a tubular shape and as the shell grows the coiled nucleus is discarded, leaving a tubular shell which in many species is also discarded after the permanent shell begins to form. The end exposed after this separation is closed by a plug, or septum having a form which may be ungulate, mucronate or mammillate. The tubular shell may be smooth, longitudinally ribbed or transversely marked by encircling ribs, these annulations being more or less prominent and crowded. They vary in color from a light brown to a chalky white resembling a dead shell, though often preserving the operculum. When smooth the shell is often hyaline.

If one desires specimens of this interesting group he may usually find them in the sand which drops out of sponges kept in a druggists' box or drawer.

It must be understood that the following designations do not imply that I regard the forms as representing the species assigned to them. Doubtless some of them are different; but re-

[1] De Folin's work, "Les Fonds de la Mer," is now contained in the library of the Academy.

calling what de Folin and Carpenter say in regard to the extreme variability of what are supposed to be species, I judge it better not to encumber the synonymy by creating new names.

Caecum annulatum Brown. Pl. V, Fig. 1.

A single specimen in the collection resembles the figure given by Tryon. At first sight it suggests *pulchellum* but enlarges more rapidly towards the aperture. It differs also in having three or four large costae next to the margin or lip.

Caecum cooperii Smith. Pl. V, Fig. 2.

This species was discovered by Sanderson Smith in Gardiner's Bay at the end of Long Island in five fathoms. This is a very distinct form. From one specimen which was white and chalky and resembled a dead shell I obtained the operculum which was orbicular, thick, brown in color, concave with six sharp revolving ribs, sinistral in direction, indicating that the shell was dextral. In various references to the operculum of Caecidae no mention is made of the direction of the revolving striae.

Stimpson in his "Shells of New England" figures accurately the operculum of *Caecum pulchellum*, showing the sinistral spiral of the lines of growth, yet makes no reference to its significance. Even Carpenter in his monograph while describing a number of opercula of different species makes no mention of the direction of the striae. He describes the shape of the operculum, whether flat, convex or concave, whether thick or thin, the color, etc., but not a word is given as to whether the spiral lines are dextral or sinistral. In his examination he used a ⅛in. obj. and the direction of the lines must have been very plain. With the lowest power of Zeiss the direction of the spiral was easily detected.

Caecum johnsoni Winkley. Pl. V, Fig. 3.

This was first discovered at Woods Hole. The drawing is made from a co-type in the collection of the Boston Society of Natural History. I am indebted to Mr. C. W. Johnson for the loan of it and for other kindnesses. The septum is subungulate and has transverse lines of growth. It resembles the figure in Tryon of *C. achirona* of de Folin.

Caecum auriculatum de Folin. Pl. V, Fig. 4.

A number of specimens in the collection resemble the figure of this species as given by Tryon. The shell is thin, white, hyaline, very narrow for its length, faintly enlarging toward the aperture. Near the aperture faint lines of growth are seen. The septum is distinctly hemispherical or mammillate.

Caecum clarkii Carpenter. Pl. V, Fig. 5.

A number of these glassy tubes were found identical in shape to *C. auriculatum* but only half the size. It cannot be an early deciduous stage because the diameter of the tube is much smaller. *C. clarkii* as figured by Tryon bears some resemblance to this form. It has the same hemispherical septum. The operculum is light corneous in color, flat with a central smooth area with a distinct knob in the centre; this area surrounded by minute lines of growth. The form approaches *C. cornubovis* of Carpenter.

Caecum nitidum Stimpson. Pl. V, Fig. 6.

This form of which a number of specimens were found is without question Stimpson's species described as a Florida shell.

Meioceras sp., Carpenter. Pl. V, Fig. 7.

Two specimens in the collection are identical with the figure given by Tryon. Its distribution is given from Florida to Rio de la Plata.

Stimpson described under the name of *pulchellum* the first Caecum discovered on the New England coast and gives an excellent figure of it in his "Shells of New England." The species was dredged in ten fathoms of water in New Bedford harbor. The other two species of New England Caecum were also found south of Cape Cod. By far the larger number of Caecum collected at Easton's Beach consisted of *C. pulchellum*. Miss M. W. Brooks also collected a number of Caecum at Narragansett Pier and most of these were *C. pulchellum*. The shell is light horn color and easily distinguished. The second deciduous stage of *pulchellum* was very common in the collection. The shell enlarges quite rapidly towards the aperture and is more

sharply curved than in the adult. A few of the forms figured by Tryon suggest the second deciduous stage of other species.

In the foregoing attributions I am indebted to the two plates of Caecidae given in Tryon's Manual of Conchology, Vol. 8. I may remark that all the species referred to are Atlantic coast forms, the west coast of Europe, the east coast of the United States south of Cape Cod, Teneriffe, Florida, West Indies and Brazil.

EXPLANATION OF PLATE V.

1. *Caecum annulatum*, Brown.
2. *Caecum cooperii*, Smith.
3. *Caecum johnsoni*, Winkley.
4. *Caecum auriculatum*, de Folin.
5. *Caecum clarkii*, Carpenter.
6. *Caecum nitidum*, Stimpson.
7. *Meioceras* sp., Carpenter.

A EUROPEAN MOLLUSK, HELCION PELLUCIDUM, NEVER BEFORE RECORDED IN AMERICA.

BY EDWARD S. MORSE.

In looking over the sand from Easton's Beach, Newport, containing Caecum, I discovered a minute specimen of the beautiful limpet *Helcion pellucidum* of Great Britain. It was not over a millimeter in length. I first detected it by the opalescent markings like iridescent glass. These markings appeared as four irregular-shaped areas near the anterior margin. In my paper on An Early Stage of Acmaea (Proc. B. S. N. H., Vol. 34, pp. 313–323), I became familiar with the protoconchs of *Acmaea testudinalis* and *A. alveus* and they do not even remotely resemble the young *pellucidum*. The shell is corneous, narrowing slightly behind. Without the metallic markings it would have suggested *Helcion pellucidum*, but with these iridescent spots it was unmistakable. So far as I know this species has never been found on this side of the Atlantic. Miss M. W. Brooks discovered another European species, *Homalogyra atomus* at Newport and Narragansett Pier.

In the American Journal of Science, Vol. 20, 1880, Verrill in a brief note records finding in the docks at Newport a European species never before recorded as American, *Truncatella truncatula*.

With the tremendous traffic going on for nearly two years in the conveyance of troops and provisions we may confidently look for other introductions of European species.

PRATICOLELLA CAMPI, SP. NOV. (PLATE VI, FIGS. 1 TO 4.)

BY GEO. H. CLAPP AND JAS. H. FERRISS.

Shell narrowly umbilicated, globose, shining, opaque white with translucent corneous bands, usually one just above the periphery, one just below and numerous bands down to the umbilicus, or the shell may be all opaque or all translucent below the periphery. Whorls 4 with well impressed suture, body whorl rounded, periphery high some shells showing a slight angularity at the periphery. Aperture lunate-rounded, slightly oblique, somewhat dilated above, lip thickened within and widely dilated at the columellar insertion; there is a distinct, though thin, callous deposit connecting the ends of the lip.

Diameter 6, altitude 4 mm. There is a slight variation in size but above is about the average. Animal not observed.

Type locality, Fort Brown, Brownsville, Texas. "In sandy soil from 1 to 6 inches below the surface, at the foot of the brick piers" (J. H. F.). It was also found in the "axils of banana plants" and in the soil on the eastern side of the parade ground, in both instances with a number of other snails. Collected by Jas. H. Ferriss and R. D. Camp in midwinter, 1913–1914. Camp reports, Nov., 1918, that "the old building where we found it has been removed and the parade ground torn up by changes for the war."

We take pleasure in naming this species after Mr. R. D. Camp who, for several years, has been collecting in the Brownsville region.

Mr. Ferriss noticed this form when first collected and insisted that it was not the young of either *P. berlandieriana* or *griseola* which were found with it; there was too much evidence of maturity and its subsequent detection in drift from the Rio Grande confirms this opinion.

It differs from the young of the other species in being more

solid and less translucent, and by the *constantly thickened and dilated lip and the presence of the callous deposit.* The umbilicus is also wider, being nearly double the diameter of that of the young shells. The aperture is wider and more rounded, that of the young of the above-named species being distinctly subangular at the base. As a rule the spire of the young shells is more prominent and the suture deeper, the young shells are also *distinctly angular at the periphery.*

Figs. 1, 2, 3, 4, *Praticolella campi* Clapp and Ferriss.

Figs. 5, 6, 7, *Praticolella griseola* (Pfr.) juv.

STYLOBATES, A WARNING.

BY WILLIAM HEALEY DALL.

Some fifteen years ago a colleague interested in crustacea and whose habit it was to bring me the empty shells from which he had extracted hermit crabs, left on my desk a jar of alcohol containing half a dozen horny objects having the aspect of a large gastropod shell, flexible, yet keeping shape fairly well while moist. The specimens were of a brownish color with beautiful coppery or bronze reflections. Some were torn, but several retained their shape in a nearly perfect manner. Of the most perfect one, the drawings were made which illustrate this note (Plate VI, figs. 8, 9, 10). The specimens recall the large horny *Velutina* so common in Bering Sea, but of course being nearly three inches in greatest diameter are immensely larger. They were obtained in water between 220 and 436 fathoms deep between Oahu and Molokai islands of the Hawaiian group, by the U. S. Fish Commission steamer Albatross, in 1903.

The "shells" when collected contained each a hermit crab of large size and served as a pedestal for from one to three large Actinias.

After due consideration, and the exhibition to my colleagues in the Museum of these singular specimens, I described them as a new genus in the NAUTILUS.[1] Had there been any marked

[1] *Stylobates aeneus,* NAUTILUS. Vol. XVII, No. 6, pp. 61–2, October, 1903.

irregularity in the different specimens I should have been more cautious, but this was not the case in this instance. However, a year or two later another batch was received, and this time the "shells" were no two alike, and most of them with comparatively little resemblance to a normal shell.

The blunder was clear. These specimens were secretions from the bases of the Actinias, but how the first lot attained the regularity shown by the figures is still a mystery. The readers of this article must assess my culpability.

NENIA COOKI N. SP. (PLATE VII, FIGS. 11, 12, 13.)

BY H. A. PILSBRY.

The shell is thin, obesely fusiform, the diameter contained about $2\frac{1}{2}$ times in the length, composed of six whorls, the first $1\frac{1}{2}$ strongly convex. The first four whorls form a rapidly enlarging cone; the next whorl is much inflated; and the last whorl is large, somewhat flattened peripherally in its first half, then rapidly contracting, concave a short distance below the suture; the neck rounded and shortly descending, free in front. Surface mat, of a chamois tint, but darker on the antepenult, paler on the last whorl; covered with a very thin cuticle. The apex is entire, obtuse. First whorl smooth, the next having delicate striae; on the third whorl low, coarse wrinkles appear, and the following whorls have coarse sculpture of irregular, retractive wrinkles. On the neck they become sharper, more crowded, and less oblique to the growth lines. The aperture is but slightly longer than wide, rounded, ivory-yellow within. Peristome broadly expanded, faintly flesh-tinted within, with a narrowly reflexed white edge. The superior lamella is high, sinuous, continuous with the spiral lamella. The inferior lamella is strongly developed. Subcolumellar lamella is deeply immersed. The principal plica is lateral, running in to the middle of the dorsal side, where its inner end is closely contiguous to the upper end of the lunella. The lunella is crescentic, deeply curved, and wholly visible in the aperture (seen foreshortened in fig. 11).

Length 27.8 mm., diam. 11.5 mm.; aperture, length 9.7 mm., width 8.6 mm.

The clausilium is widest in the middle, tapering towards both ends. It is a little thickened at the distal end, and the main curvature is near the filament.

Type, Cat. No. 215084 U. S. Nat. Mus., from the Peruvian Andes, in the vicinity of San Miguel (6,000 ft.), Urubamba Valley, Province of Caxamarca, Peru, collected by Dr. O. F. Cook, and referred to the writer by Dr. Wm. H. Dall.

This species is strongly differentiated from all known Neniæ by its very obese figure and small number of whorls, none being deciduous. The sculpture allies it to such forms as *N. taczanowskii* (Lub.), which also agrees in the armature of the throat. The inflation of the penult and contraction of the last whorl give the shell an appearance of deformity. Dr. Paul Ehrmann has remarked of the genus *Nenia*[1] that Ecuador and northern Peru are its distribution center; the group here reaches its acme of differentiation, and is most numerous in species. The present species, of a shape hardly to be matched in the whole family Clausiliidæ, is a further illustration of the diversity of forms found in this focal region for Nenia.

MY JOURNEY TO THE BLUE AND WHITE MOUNTAINS, ARIZONA.

BY JAS. H. FERRISS.

At the close of a summer in the Catalina mountains, Frank Cole, the guide for tourists and bug hunters to the wilds, led me into the seventh heaven. Something over 200 miles northeast of Tucson, Mt. Thomas, also known as Sierra Blanca and Old Baldy, in this region of perfect delight, stands 13,496 feet above sea level, the highest in Arizona, and at that time unknown to conchology. Here was the chance at that mythical Oreohelix "big as a tea saucer."

[1] The late Dr. C. Boettger (1909) and most other recent authors on this group consider *Nenia* generically distinct from *Clausilia*. Its nearest affinity in the old world appears to be the Indo-Chinese genus *Garnieria*.

We left Tucson early in September, 1913, and the second night out camped at the Shaw goat ranch in the southern foothills of the Rincon group. Those hills seemed too naked and dry for our purpose and were left undisturbed. However, with more knowledge of the ways of the snail, passing that way again late in the winter of 1918, we dug into the Shaw ranch and filled two cans with Sonorellas (*S. hesterna*).

On the eastern side of the San Pedro river, John Lyon's mountain and the southern end of the Bonito range gave up only a couple of *Thysanophora hornii.* Snails have been reported in the Little Dragoons, only four miles from our trail, but were passed by. The White mountains were ahead and high. Physas and Succineas were abundant at the watering places for cattle, and box tortoises and rattlers plentiful in the desert.

The Graham mountains on the south bank of the Gila river, so high that there is yellow pine and quaking asp, plentiful enough for saw-mills, has Sonorella and Oreohelix. Camp was made in Stockton pass for a day, and a collection gathered at Mud Springs on the summit. However, between climbing and the descent made by moonlight, only a couple of hours could be given to the real work, and the collection was small. The *Sonorella* reminds one of the odorous species of the Santa Catalinas, and has been described as a new species, *S. grahamensis.* The deep forest on the north side of this range is promising. Safford, on the railway not over ten miles from the peak, with an easy ascent, would be a convenient base for an explorer.

From Solomonville to Coronado (on other branches of both river and railway) a toll road is graded more or less, between low hills of the Peloncillo range. Rock slides were plentiful, but at that time also seemed to be too naked and dry. Cnly one slide, six miles from Coronado, was disturbed, and this one had Sonorella (*S. delicata*) and one of the rare Price's rattlers. The snake was hustled into a Velvet Joe tobacco can with the snails, and all drowned in the Gila. Here I had another walk by moonlight in a strange country, but Cole had a hot supper ready. This Peloncillo range needs further investigation. It is about 130 miles in length, from Clifton to a point on the

Mexican border, and has been worked less than half a day. Daniels and I discovered *Sonorella hachitana peloncillensis* near Rodeo, New Mexico, in 1907, and F. H. Fowler found the same species in Doubtful Canyon, S.-W. New Mexico. Otherwise the shells of the range are unknown.

The wagon was stored at Clifton, a $30 saddle horse purchased, of course including saddle and bridle, and two pack mules hired. Here is a beautiful and prosperous city of about ten thousand people, out on the side of the world. The dwellings seem to hang on brackets from the cliffs. The smelters and business houses are huddled together in pockets along the San Franciso river wherever the castellated cliffs will permit.

There were some attractions for weary travelers and it was late in the day when our train got under headway. Before the packs were lashed the new mules had sung out symptoms of homesickness, and to hold them true to the trail the pack animals were tied together in a string, Cole leading, and leading fast. At a sharp turn in the trail the swing mule was swung upside down into a creek. A few groceries were dampened this time and a mule repacked. Then the mules were turned loose. Going up a steep hill a packhorse heavily loaded, carrying two guns on top of its pack, tipped over backwards, unhorsed Cole and came down the hill like a wheel on its spokes. A fat, shiny, blue-black stage driver, so joyful he was not attending to his business, ran his four-in-hand into our belongings, adding considerably to both annoyance and oratory.

A new and wide trail from Clifton to Metcalf, high up on the cliffs, ended in the blacksmith shop of the trail builders, forcing us down the hill upon the old trail along a railroad track with many tunnels. By that time it was dark in the open country, and not a time-table or a lantern in the outfit.

At Metcalf one of the new mules dashed through a group of celebrating miners and hid under an outside stairway. That intellectual animal would have missed a glorious trip had it not been for the assistance of those helpful miners.

With the mule tied in line again we ate a cold snack in the saddle and pushed on and on in search of a country level enough to tie up mules and spread blankets. At a late hour we

compromised and camped anyhow. Beds were made in the trail. Before saying good-night a couple of heavily armed men came riding rapidly up the trail in search of a horse thief. We were questioned closely and our steeds inspected by flashlight. They did not find a chestnut horse, and we escaped.

Next a ranchman, we had heard helping the Metcalf Mexicans celebrate their independence day, came riding, roaring, questioning and horse inspecting. Easily satisfied or something, and without declaring intentions, he dropped his bridle reins on the ground and plumped into bed with Cole, hat, boots and pistol.

These adventures of an afternoon were all we had. In the morning light Cole recognized in the roaring midnight rider an old and generous acquaintance, and gave a monster breakfast in his honor. Every day after is a delightful memory—in snails, venison, bear meat, mountain trout, interesting people, magnificent forests, beautiful parks and newness botanically. Here was a paradise in gentian time, fringed and unfringed, with mountain asters and pentstemons.

From Clifton to the Double Circle ranch on Eagle creek it is a rough country, mostly forested and with sufficient rock slides for cover; but the snails do not like it. The trail here ran northwesterly for about 35 miles. Then directly north on Eagle creek to the south rim of the Blue mountains, 16 miles, except a short diversion eastward to get an easier climb.

Pupas and Vallonias were found near the Honeymoon U. S. ranger station, and a mile or two farther came in the Oreohelix, fifty miles from Clifton and fourteen days from Tucson. Here Cole found the bear. A party of Tucson friends in camp had been looking for it, so we split fifty-fifty, the rug going with the snail collection.

The rim of the Blue has a wall of broken granite. We found *Ashmunella mogollonensis* and a greyish form of *Oreohelix cooperi*. The latter is also found in the quaking asp and cork-bark fir groves of the vicinity, and upon the slopes of the White mountains. Our route lay northwesterly again across the K. P. *ciénaga*, down Corduroy and Fish creeks and across Black river to Reservation creek, the eastern boundary of the Apache nation, perhaps 20 miles. This is in Apache county.

Here were the mountain trout, the Colorado river Cut Throat (Salmo mykiss pleuriticus, Cope), a pound each; wild turkeys in flocks of one and two hundred, blue grouse, beaver, Abert's squirrel with its tufted ears, and a deep forest untouched by axe, fire or wind; and please do not complain if the shell collection is not as large as it ought to be. Upon this high plateau it was a continuous forest of the largest yellow pine, blue spruce, Douglas spruce, thickets of quaking asp 150 feet high, alder and cork-bark fir—(*Abies arizonica*, Merriam). There are wild peas and black gama grass, and cattle fatter than the average corn-fed herds.

The Black river, known as the Salt river farther down, is one of the beautiful streams of America. No dirty water or naked banks here, but a robust forest and a sodded turf. It takes a good part of an hour to climb to the plateau above. Well swept lawns with enough of the large pines for landscape beauty, and wide enough for the snail-hunter's camp and his horse feed, either on one or both sides of the stream, and Oreohelix from white to black, from high to low, in every rock pile.

Physas and Pisidiums were plentiful in Reservation creek and a few Oreohelix were in the rocks. The next twelve or fifteen miles north the country was higher, with prairie parks and a few lakes. Besides the few *Oreohelix cooperi* on the south slope of Mt. Thomas there was an abundance of the Vertigos, Pupillas and other small species. The trees were so close together here that the horses were left at the camp and we climbed the easy slope on foot. The dome-like summit of Thomas, with its stunted spruces, bogs and moss, had a few shells, and none were found alive.

The scenic effect was concealed by flurries of snow. At camp in the morning the snow was ankle-deep and still falling. It was cold. Our packing ropes were like rods of iron, and we moved. In an hour we rode into pleasant weather and the days after were perfect. On the return trip the Raspberry trail from the rim of the Blue mountain to the Blue river was taken, landing us at Cosper's ranch.

Down the Blue and San Francisco rivers Ashmunellas (*A. pilsbryana*), two new Sonorellas and Oreohelix were found in

the slides investigated, but it was again a hurried journey. The next year with the assistance of L. E. Daniels the work was thorough.

Oct. 17th, a month and a half from Tucson, the collector, snails, snakes and ferns were on the train homeward bound, and Cole wending his way over the toll road Tucson-ward. Theodore, that splendid thirty-dollar horse, and also one of Cole's, ate too much of a dry, short, delicate, mischievous grass, and died at the end of the trip.

A NEW OPISTHOSIPHON FROM CUBA.

BY WILLIAM F. CLAPP.

Opisthosiphon berryi sp. nov. Plate VII, fig. 14.

Shell longitudinally, finely plicate, ochraceous buff, encircled with a broad chocolate-brown band on the periphery of the last whorl and on the lower half of the earlier whorls; slightly shining; decollated; suture deep, crenate; four or five spiral ridges appearing in the umbilical region; whorls (remaining) four, very convex; aperture vertical, circularly oval, peristome white, double; the inner, a brief continuation of the whorl; the outer, on the right side, smooth, slightly expanded, at the suture broadly expanded and excavated over the breathing tube, adnate to the penultimate whorl; columellar margin expanded horizontally above in a broad flange adnate to the penultimate whorl, a large lobe curving over and nearly covering the umbilical region, interrupted below by a broad sinus where the lip is abruptly reflexed and attached to the whorl, a smaller lobe expanded horizontally below. A minute breathing hole within the aperture near the posterior angle, connects with a tube, somewhat concealed in the expanded and excavated lip, which curving back to the suture, descends and ends in the narrow space between the ultimate and penultimate whorls. Numerous strong raised lamellae mostly originating on the inner lip but occasionally extending along the parietal lip, cover that portion of the tube visible within the lip. Operculum as in Opisthosiphon pupoides.

Length (type) 13.5 mm. *g.d.* 9 mm. *l.d.* 7.3 mm. *g.d. aperture* 4.7 mm. *l.d.* 4 mm.

Length (paratype) 14.5 mm. *g.d.* 9.7 mm. *l.d* 7.5 mm. *g.d. aperture* 5.5 mm. *l.d.* 4.3 mm.

Collected by Dr. S. S. Berry, March 1, 1814, at Cariji, Cerro de Tuabaquey, Prov. Camaguey, Cuba.

Type M. C. Z. No. 42005; Paratype, collection of Dr. S. S. Berry.

The chocolate-colored band is the most striking character of *Opisthosiphon berryi.* Compared with *O. pupoides* Mor. it has more convex whorls, more numerous and finer plicae, the outer lip is smooth, much less broadly expanded below and over the breathing tube is bent forward rather than being reflected back, as in *O. pupoides.* The columellar lip does not completely cover the umbilicus, as in *pupoides,* and its two lobes are much more widely separated. The operculum is very similar to *O. pupoides*, differing only in being slightly more oval. In the larger specimen very faint traces of fine chestnut-colored widely interrupted spiral bands may be seen on the upper half of each whorl, very similar in arrangement and color to those seen in *O. pupoides.* A young specimen shows the embryonic shell to consist of about 1½ smooth whorls, the brown band and longitudinal plicae beginning at about the second whorl, the plicae becoming gradually more numerous and the intervening spaces less wide.

I am indebted to Mr. Berry for the opportunity to examine this species. It is closely related to *Opisthosiphon pupoides* Morelet from the Isle of Pines. The similarity of the shell fauna of Camaguey, Santa Clara, and the Isle of Pines, has been noted by Mr. John B. Henderson (Naut., Vol. 27, p. 137; Naut., Vol. 29, p. 18). Mr. Henderson also calls attention to the confusion in the genera of the Cyclostomatidae.

The species described above belong to Opisthosiphon, Dall (Proc. Mal. Soc. Lond., 1905, p. 209). Shells which possess the operculum of a Rhytidopoma and in addition are provided with a tubular projection behind the outer lip belong here. Undoubtedly when all of the characters of the species placed in this group are known, it will be found to be a natural one, and

yet it is true that the value for showing relationships, of accessory breathing apparatus among the land operculates, is to be questioned. The necessity for obtaining air when the aperture is tightly sealed with the operculum has apparently caused many genera not at all closely related to develop ingenious and occasionally somewhat similar breathing contrivances. Species of Pterocyclos, Spiraculum, Rhiostoma and Tomocyclos, while not closely related to our American land operculates have developed breathing apparatus similar to that of some of the American species. The American shells belonging to the Ericiidae, the genera of which are founded to a great extent on the characters of the operculum, show great variation in the apparatus through which air is introduced into the lumen of the whorl when the aperture is closed by the operculum. At least three types of accessory breathing apparatus may be seen.

First. With perforation connecting with visible external tube.

a. Operculum of Rhytidopoma.

1. Tube greatly prolonged, entering umbilicus.

Opisthosiphon rugulosum Pfr. Matanzas.

Opisthosiphon denegatum Poey. Isle of Pines.

2. Tube short, external opening towards and close to preceding whorl.

Opisthosiphon bahamense Sh. Bahamas.

3. Tube short, disappearing in the snture between the ultimate and penultimate whorl.

Opisthosiphon pupoides Mor. Isle of Pines.

4. Tube short, straight, not recurved.

Opisthosiphon sculptum Gundl. Cabo Cruz.

b. Operculum of Choanopoma.

1. Tube as in *Opisthosiphon pupoides* Mor.

Choanopoma uncinatum Arango. Sta. Clara, Cuba.

Second. With perforation opening directly into umbilical region or exterior of shell.

a. Operculum of Choanopoma.

Choanopoma blaini Gundl. Galalon, Cuba.

b. With operculum of Cistula.

Cistula limbifera Mke. Matanzas.

c. With operculum of Chondropoma.

Chondropoma egregium Gundl. Pinar del Rio, Cuba.

d. With operculum unknown.

Licina percrassa Wright. Pinar del Rio.

Third. With perforation not penetrating to exterior of whorl but connecting with an internal air space which is situated in the upper angle of the whorl and extends back from the aperture for a considerable distance. In some specimens it may be traced for over two whorls.

Rhytidopoma bilabiatum Orb. Pinar del Rio.

The first group has a restricted geographical distribution extending from the Bahamas through central Cuba to the Isle of Pines. *Choanopoma uncinatum* Arango while possessing the typical Opisthosiphon breathing tube has the very different operculum of a Choanopoma. It therefore cannot be included in Opisthosiphon, and until a careful study of the animal shows its true relationships may be retained as an aberrant Choanopoma.

The second group is confined to western Cuba and while containing species with very different opercula, and therefore a group of apparently no systematic value, is nevertheless interesting, in that it is confined almost entirely to Pinar del Rio, and entirely to western Cuba.

The third group, of which I have seen but one species, is of interest because of the fact that in this case the perforation and internal tube appear to be of no practical value; for, though one might be led to expect that at certain stages of growth, communication to the exterior might exist through the external sutural flanges, I have been unable to find any structural evidence of such connection.

It would appear from the above that if the breathing tube is to be considered of value as a generic character together with the operculum, as in the case of Opisthosiphon, *Choanopoma uncinatum* Arango would have to be placed in a new genus, the operculum being very different from that of Opisthosiphon; while the breathing tube, having been considered of sufficient

importance to separate Opisthosiphon from Rhytidopoma, would also have the same consideration in separating *C. uncinatum* from Choanopoma.

It would also seem that if the breathing tube restricted for Opisthosiphon is of generic importance that the modified perforation seen in so many of the Ericiidae from western Cuba should also be considered of value generically. This would mean, providing that the operculum was still considered of generic value, the removal of species of Choanopoma, of Cistula and of a large number of Chondropoma to new genera.

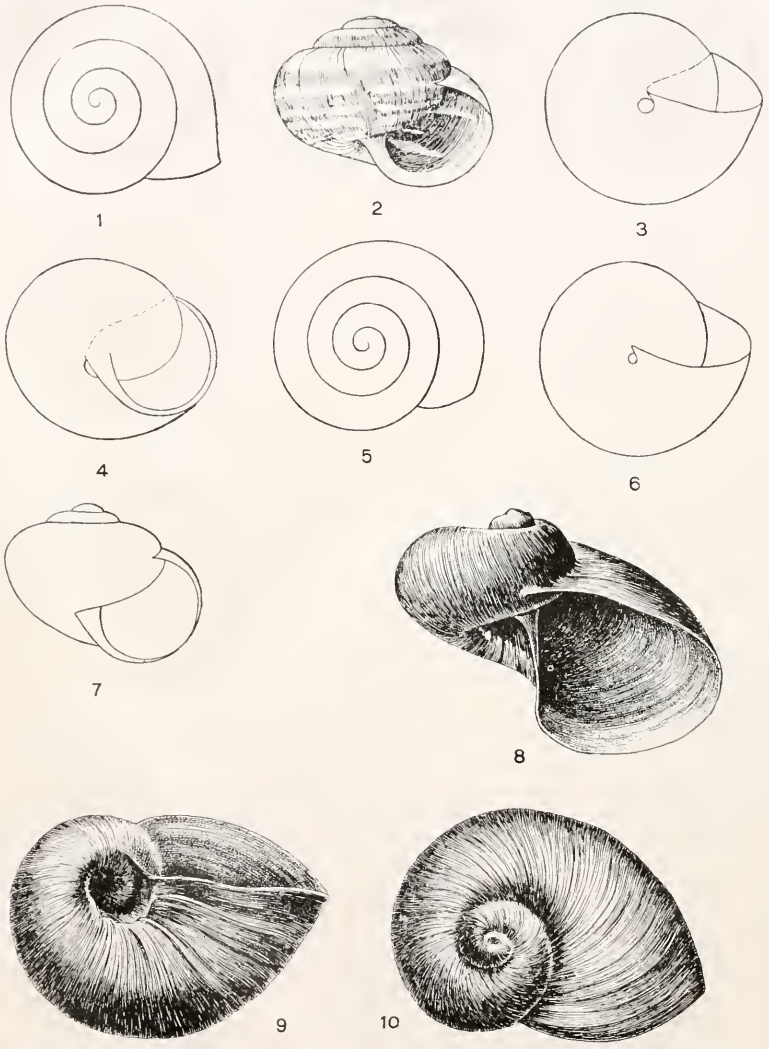
This would merely be substituting chaos for confusion and, until the anatomy of many of the species has been carefully examined, it would seem better to merely call attention to the peculiarly restricted distribution of those species of the Ericiidae, which have made structural changes in the shell, probably, as Dr. Dall suggests (Proc. Mal. Soc. Lond., 1905, p. 309) to enable them to obtain air when the aperture is closed by the operculum.

SOME MARINE MOLLUSCA ABOUT NEW YORK CITY.

BY ARTHUR JACOT.

To aid any New-Yorkers interested in the shells of their vicinity, I am taking this opportunity of giving them the results of a few studies which were made during the past year in that region.

The coast of Staten Island from Fort Wadsworth to Great Kills was carefully gone over at low tide several times. Along this strip are three definite stations. The first (1) is an expanse of red sand flats (exposed only at low tide) at the mouth of the stream which drains the marshland between South and Midland Beaches. This is the only place where I found *Periploma leanum, Pandora gouldiana and Lyonsia hyalina.* Another station (2) opposite the Oakwood Heights station on the steam railroad to Tottenville, is a "sod-bank" formation, beautifully showing the encroachment of the sea on



1-4. PRATICOLELLA CAMPI CLAPP & FERRISS, ×5.
5-7. " GRISEOLA PFR., YOUNG. ×5.
8-10. STYLOBATES ÆNEUS DALL, SLIGHTLY OVER ½ NAT. SIZE.

1–10. BAKER: ON PLANORBIS.
11–13. NENIA COOKI PILSBRY.
14. OPISTHOSIPHON BERRYI W. F. CLAPP.

the land. The "banks" wherever submerged, are covered with *Modiolus plicatulus* among which and over which crawl *Littorina littorea* and *L. rudis*. The third station (3) is inside the isthmus which encloses the bay near the second station. Here there is an eel-grass bed which is exposed at low water.

The only species of note at Rockaway Beach (4) is *Astarte castanea* which can be picked up in front of or a little beyond the hospital to the west of the pleasure beach. Far Rockaway Beach (5) yielded the greatest number of species. This is especially due to the rift of fine shell material left by the receding tide at the angles of the bar which begins to the west of the "bathing beach."

The numbers in the following list correspond to the stations as designated above.

Pelecypoda.

Nucula proxima truncula Dall. A valve at 5.

Yoldia sp? Fragment at 5.

Arca campechiensis pexata Say. Generally distributed.

Arca transversa Say. Less common than preceding.

Ostrea virginica Gmelin. Generally distributed.

Pecten gibbus borealis Say. Most common at 4 and 5.

Anomia simplex d'Orbigny. Generally distributed.

Mytilus edulis Linnaeus. Generally distributed.

Mytilus edulis pellucidus Pennant. Not as common as on Conn. coast.

Modiolus demissus plicatulus (Lam.). Local. Abundant where found.

Periploma leanum (Conrad). Rare and only at 1.

Pandora gouldiana Dall. One valve at 1.

Lyonsia hyalina (Conrad). Only at 1.

Astarte castanea (Say). At 4, very small specimens at 5.

Venericardia borealis (Conrad). Only at 5.

Divaricella quadrisulcata (d'Orbigny). Occasional at 4 and 5.

Rochefortia planulata (Stimpson). Occasional at 5.

Aligena elevata (Stimpson). Not as common as preceding.

Cardium pinnulatum Conrad. One valve at 5.

Callocardia morrhuana (Linsley). At 1 and 5.

Venus mercenaria Linnaeus. Becoming less common.

Venus mercenaria notata Say. True form very rare.

Gemma gemma (Totten). Generally distributed.

Gemma gemma purpurea (H. C. Lea). Different habitat than preceding.

Petricola pholadiformis Lamarck. Generally distributed.

Tellina tenera Say. Fine specimens at 1.

Tellina tenella (Verrill). One valve at 1.

Tellina versicolor De Kay. Fine specimens at 5.

Macoma balthica (Linnaeus). Commonest at 2.

Tagelus gibbus (Spengler). At 5.

Ensis directus (Conrad). Generally distributed.

Siliqua costata (Say). Found only at 5.

Spisula solidissima (Dillwyn). Very abundant at 4.

Spisula solidissima similis (Say). Occasional.

Mulinia lateralis (Say). Generally distributed.

Mya arenaria Linnaeus. Generally distributed.

Corbula contracta Say. Found only at 5.

Barnea truncata (Say). At 1, 3 & 5, but especially common at 3.

Zirfaea cripata (Linnaeus). One valve at 5.

Teredo navalis Linnaeus. At 5.

Gasteropoda.

Dentalium sp? Fragment at 5.

Pyramidella fusca (C. B. Adams). Several specimens at 5.

Pyramidella winkleyi Bartsch? Two or three specimens which seem to be this species.

Turbonilla nivea (Stimpson). Only at 5, where it is the commonest *Turbonilla.*

Turbonilla aequalis (Say). I have referred 7 of my specimens to this species.

Turbonilla vinea Bartsch. Two specimens from 5.

Turbonilla areolata Verrill. One specimen, but with six rather than five spiral rows of pits, from 5.

Turbonilla interrupta (Totten). This is the typical form, not as described by Bartsch, but as described by Bush. The

color band is well marked in all my specimens (six). Found only at 5.

Odostomia (*Chrysallida*) sp? Two specimens at 5.

Odostomia impressa (Say). Several specimens at 5.

Odostomia trifida (Totten). Abundant at 5, found also at 3.

Odostomia bisuturalis Say. At 3 and 5.

Epitoneum multistriatum (Say). Three specimens at 5.

Polinices duplicata (Say). Generally distributed, fine specimens at 4.

Polinices heros (Say). Generally distributed, fine specimens at 4.

Polinices triseriata (Say). Occasional.

Crepidula fornicata (Linnaeus). Generally distributed.

Crepidula glauca Say. Found only at 2.

Crepidula glauca convexa Say. Generally but thinly distributed.

Crepidula plana Say. Generally distributed.

Paludestrina minuta (Totten). Occasional at 5.

Paludestrina laevis (De Kay). Common at 5, a few at 3.

Adeorbis supranitidus lirata (Verrill). Several specimens at 5, all being of this subspecies.

Litorina littorea (Linnaeus). At 2, 3 and 4.

Litorina obtusata palliata (Say). Only found at 5.

Litorina rudis (Donovan). Abundant at 2.

Lacuna vincta (*fusca*) Gould. Found at 2, 3 & 5.

Triphoris perversa nigrocincta (C. B. Adams). Several specimens at 5.

Cerithiopsis greenii (C. B. Adams). Several specimens at 5.

Bittium alternatum (Say). Fine specimens at 5.

Eupleura caudata (Say). Generally distributed.

Urosalpinx cinerea (Say). Generally distributed.

Columbella avara similis Ravenel. A specimen at 2.

Columbella lunata (Say). Generally distributed.

Alectrion obsoleta (Say). Generally distributed.

Alectrion trivittata (Say). Generally distributed.

Busycon canaliculata (Linnaeus). Generally distributed.

Actaeon punctostriatus (C. B. Adams). Several specimens at 5.

Tornatina canaliculata (Say). Fairly common at 5.
Cylichna oryza (Totten). Several specimens at 5.
Melampus lineatus Say. Most common at 2.
Alexia myosotis (Drap.) Fairly common at 3.

On a tramp up and down the western end of Long Beach point, Long Island, I picked up the following interesting forms, besides forty-eight of the commoner species:

Yoldia limatula (Say). 1 valve.
Arca ponderosa Say. 3 valves.
Astarte castanea (Say). Common.
Tellina tenella (Verrill). 1 valve.
Tellina versicolor De Kay. 2 valves.
Barnea costata (Linné). 1 valve (fragment).
Cavolina telemus (Linné). 1 specimen.

DESCRIPTION OF A NEW SPECIES AND VARIETY OF PLANORBIS FROM POST-GLACIAL DEPOSITS.*

BY FRANK C. BAKER.

Planorbis parvus urbanensis n. var. Pl. VII, figs. 4-6.

Shell differing from *parvus* by having a round aperture, the last third of the body whorl being depressed below the general level of the spire, deeper sutures, channelled in most individuals, and a deeper umbilical region. The body whorl has not quite as great transverse diameter as in typical *parvus*. In *parvus* (pl. 1, figs. 1-3), the whorls are typically in the same plane, the aperture is oblong or long ovate and the sutures are impressed but not channelled. The umbilical region is also less impressed and has a "reamed out" appearance.

Height at aperture, 1.00; greatest diameter, 3.00 mm. Holotype.

Height at aperture, 1.00; greatest diameter, 3.00 mm.

* Contribution from the Museum of Natural History, University of Illinois, No. 1.

Height at aperture, .80; greatest diameter, 2.75 mm. Cotype.

Height at aperture, .80; greatest diameter, 2.50 mm. Cotype.

Holotype, number Z 10772 and paratypes number Z 10773, Museum of Natural History, University of Illinois. Cotypes of *urbanensis* and *altissimus* have been placed in A. N. S. Phila.

About 40 specimens of this form of *parvus* occur in the marl collections taken from the University of Illinois campus. The characteristics mentioned above appear to be very constant and the race or variety of *parvus* seems distinguishable enough for a distinct name. There were none of the *parvus* form in the material. This may be a Pleistocene species that has become extinct. Nothing similar has been seen in other marl collections available for study, but it would seem that it should be looked for in marl deposits, especially the older marl beds overlying the earlier drift sheets, or in deposits between these sheets—interglacial.

Planorbis altissimus n. sp. Pl. VII, figs. 7-10.

Shell depressed, with flatly rounded periphery which is placed below the center of the whorl; lines of growth fine, crowded, but surface without spiral ornamentation; whorls 4, regularly increasing in diameter, sloping flatly to the rounded periphery; spire whorls sunken below the general level of the surface, the whorls forming a rather sharp v-shaped suture, causing the shell to resemble a miniature *Planorbis antrosus* and producing a subacute carina on the upper surface of the whorls; base of shell deeply concave, forming a wide, saucer-shaped depression and umbilicus; the earlier whorls are carinate on the under side but the last whorl is rounded; the last half of the last whorl is markedly deflected, forming a contact with but half of the preceding whorl; aperture roundly ovate, shouldered above, the dorsal margin much produced over the ventral margin, the parietal callus joining the margins and causing the aperture to be continuous.

Height at aperture, 2.00; greatest diameter, 4.50 mm. Holotype.

Height at aperture, 1.75; greatest diameter, 4.25 mm. Cotype.

Height at aperture, 2.00; greatest diameter, 4.00 mm. Cotype.

Height at aperture, .90; greatest diameter, 2.00 mm. (young, 3 whorls).

Holotype; number Z 10775 and cotypes number Z 10776, Museum of Natural History, University of Illinois.

This small Planorbis is related to *deflectus*, but differs markedly in the form of the upper whorls which are more sharply carinated, and in the spire which is more sunken below the general level of the whorls. The umbilical region is deeper and the aperture is higher than wide. The lower part of the body whorl is more exposed below the first half of this whorl than in *deflectus*. Young specimens very strongly resemble *Planorbis campanulatus* in form.

Specimens of *deflectus* from marl deposits in Milwaukee (30th Street) Wisconsin, have occasional individuals that somewhat resemble *altissimus* in the greatly deflected last whorl but these are otherwise quite different. The new species may be looked for in marl deposits associated with *Galba obrussa decampi* and the Pisidia peculiar to the northern marl beds. Only 5 adult and 9 immature specimens occurred in the Urbana marl deposit and the new species was not, seemingly, a common inhabitant of the pond or lake.

The new forms described above occurred in a lot of postglacial fossils found in a deposit on the campus of the University of Illinois, in a ditch and in excavations for the basement of the new greenhouses. The shells were about four feet below the surface, in a deposit of marl underlying two feet of black, clayey soil. The fauna contains several species which now have a more northern range, as *Pisidium costatum, P. tenissimum calcareum, Valvata sincera*, and *Galba obrussa decampi*, and there is reason to believe that the pond in which these fossils lived occupied a kettle hole on the inner face of the Champaign moraine when the ice of the late Wisconsin glaciation was at or near Chicago. If this is so, then the

deposit is interglacial between the early and late Wisconsin invasions. A paper covering this point is in preparation.

EXPLANATION OF FIGURES, PLATE VII.

1-3. *Planorbis parvus* Say. Owasco Lake, N. Y. X9
4-6. *Planorbis parvus urbanensis* Baker, new variety. X9
7. *Planorbis altissimus* Baker, young. X9.
8-10. *Planorbis altissimus* Baker, new species. X7.

MOLLUSKS INFESTED WITH PARASITIC WORMS.

BY FRANK C. BAKER.

While carrying on biological work for the New York State College of Forestry at Oneida Lake in the fall of 1917, many animals were examined to ascertain the degree of parasitation by worms. The hosts studied included fish, birds, batrachians, reptiles, and mollusks. Among the latter many interesting cases occurred, both of infestation and absence of infestation, the degree of infestation varied from none to fifty per cent. Of the twelve species examined, five were without trace of parasites and seven were infested in varying degrees. It is noteworthy that none of the Amnicolidae or Valvatidae were parasitized, and that no worms were found in the small Planorbes (*parvus* and *hirsutus*). Of those infested, five are fresh water pulmonates. The examinations were carried on under the direction of Dr. H. S. Pratt, of Haverford College. The table below indicates the species infested and the degree of infestation. All are trematode worms the species of which have not yet been determined.

Bythinia tentaculata 17 examined; no worms.
Amnicola limosa 20 examined; no worms.
Valvata tricarinata 20 examined; no worms.
Planorbis parvus 3 examined; no worms.
Planorbis hirsutus 7 examined; no worms.
Planorbis antrosus 2 examined; 1 with cercariae, 1 without.

Planorbis campanulatus 15 examined; 3 with cercariae, 12 without.

Galba catascopium 10 examined; 6 with sporocysts and cercariae, 4 without.

Galba emarginata 5 examined; 3 with cercariae, 2 without.

Campeloma integrum 3 examined; 2 with cercariae, 1 without.

Physa warreniana 9 examined; 3 with cercariae, 6 without. Small leech in mantle cavity of 3 specimens.

Goniobasis livescens 2 examined; 1 with cercariae, 1 without.

University of Illinois,
Museum of Natural History.

TYPES OF GENERIC NAMES PROPOSED FOR ACHATINAE.

BY H. A. PILSBRY.

When working on Congo Valley mollusks I noticed that while the generic names applied to the Achatinae were discussed in Manual of Conchology, vol. xvi, genotypes were not selected for some names there considered absolute synonyms. This lack is supplied in the following list. Where a type had already been selected the authority and date of selection are added in parentheses.

Achatina Lam., 1799, type *Bulla achatina* L. (Lam., 1799).

Ampulla Bolten, 1798, type *A. priamus* Bolt. (Pilsbry, 1908).

Chersina [Humphrey], 1797, type *Bulla achatina.*[1]

Achatium Link, 1807, type *A. elegans* Link = *A. achatina* (L.).

Achatinus Montfort, 1810, type *A. zebra* (Montfort, 1810).[2]

[1] The Museum Calonnianum has been rejected as a source of nomenclature by the International Commission.

[2] De Montfort appears to have confused *A. zebra* and *A. panthera* under the former name, but as he stated that *Achatinus zebra* is the type, the name belongs rather to *Cochlitoma* than to *Achatina*. Since he says that Lamarck founded the genus, it is evident that he intended *Achatinus* merely as an emendation of *Achatina* Lam., and not as a new name. It cannot therefore displace *Cochlitoma*, but will be regarded merely as a variation in orthography.

Cochlitoma Fér.. 1817, type *Bulimus zebra* Brug. (Pilsbry, 1904).

Archachatina Albers, 1850, type *A. bicarinata* Brug. (Pilsbry, 1904).[3]

Geodes Gistel, 1848, type *Bulla achatina.*[4]

Oncaea Gistel, 1848, type *Oncaea perdix*[5] = *A. perdix* Lam., = *A. achatina* (L.).

Parachatina Bourguignat, 1889, type *A. dohrniana* Pfr. (Pilsbry, 1904).

Serpæa Bourguignat, 1889, type *A. hortensiae* Morel. (Pilsbry, 1904).

Pintoa Bourguignat, 1889, *A. pfeiffer* Dkr. (Pilsbry, 1904).

Urceus (Klein) Jousseaume, 1884, type *Achatina achatina* (L.).[6]

LORENZO E. DANIELS.

L. E. Daniels was born at Mazon, Grundy Co., Illinois, March 4th, 1852. The son of a farmer, his early life was spent on the farm, and so far as known his education was in the local schools.

While a farmer in Illinois, though a Democrat in politics, he was called from the plow in that strong Republican community to take the office of sheriff. Though modest to a fault and with none of the politician or office-holder in thought or manner, the administration was nevertheless a success. The term of office was enlivened by puzzling criminal cases, including murder, and there were also serious strikes in the coal fields;

[3] *A. bicarinata*, the type of *Archachatina*, is a decidedly aberrant species. For the dextral continental species, which have the surface smoothish and even, I propose the subgenus *Calachatina*, *A. marginata* (Swains.), Man. Conch., XVI, 109, being the type.

[4] Gistel, Naturgeschichte des Thierreichs für höhere Schulen, 1848, p. viii. Geodes is a substitute for *Achatina* Lam., no species mentioned.

[5] Gistel, *tom. cit.*, p. 168. *Oncaea* is a substitute for *Achatina* Auct.; several species are briefly described.

[6] Jousseaume merely mentioned "le genre *Urceus* Klein (*Achatina* Lam.)" without any species. It therefore takes the same type as Lamarck's genus.

but this quiet farmer had courage, a known reputation for fair play, and was trusted by both workmen and employer. There were no complaints of violence in labor disputes during the Daniels regime.

The sheriff's rooms in the Grundy county court house at that time contained one of the best collections of Mazon creek fossils; for back in boyhood days the sheriff had become interested in those famous Upper Carboniferous beds near his home. In types, especially of insects, the collection contained many of the rarest species. They were worked up in a memoir by Dr. Handlirsch of Vienna, published by the National Museum. Mr. Daniels still owned this collection, together with the accumulations of many years of research in conchology, and the old Illinois homestead at the time of his death.

Mr. Daniels became interested in mollusks while a young man, and for many years collected assiduously, particularly in Indiana. For some years he was Assistant State Geologist of Indiana. Some of the results of his investigations during this period were published, in collaboration with Dr. W. S. Blatchley, the State Geologist, under the title "On some Mollusca known to occur in Indiana," and by Daniels alone, "A Checklist of Indiana Mollusca." Both appeared in 1903. At this time herpetology was added to his other interests, and in later trips the collection of snakes, horned toads and especially turtles claimed part of his attention.

Subsequently with Dr. Pilsbry, Junius Henderson and the writer, he was associated in field work many seasons in the wild places of North Carolina, Tennessee, Arizona, New Mexico, Utah and Idaho. In 1910 he joined Dr. Pilsbry and the writer in a collecting trip of several months in southern New Mexico and Arizona, and in 1914, in company with the writer, explored the Blue River region in Arizona and the Mogollon Mts., New Mexico. Many new species of *Sonorella*, *Ashmunella*, *Oreohelix* and *Holospira* were found on these excursions. In 1915 and 1916 Mr. Daniels joined forces with Prof. Junius Henderson in hunting Oreohelices in Utah and Idaho. Their results were set forth in two admirable papers, published jointly, the first exact and critical records for this fauna.

As a collector Daniels was untiring. His bag was always among the largest. He seemed to have the knack of finding unusual or abnormal shells. Some of these were illustrated by him in a special article.

Species of the molluscan genera *Sonorella*, *Ashmunella*, *Holospira*, *Hemphillia*, *Pisidium*, *Lymnæa*, of *Gerarus* and *Asemoblatta* (Upper Carboniferous insects), and probably other groups, have been named in his honor. His collections of land and fresh water shells, and of Mazon creek fossils are among the best.

Mr. Daniels was unmarried. Of late years he made his home with a sister, Mrs. James Foster, at La Porte and later at Rolling Prairie, Indiana. While on the farm be became interested in Masonry, often driving across the unbroken prairie a dozen miles on winter nights to attend lodge sessions at the county seat. He continued up to the thirty-third degree and the final services at La Porte were conducted by the Masonic fraternity.

In person Daniels was of the tall, strongly but loosely built Illinois type, of which Lincoln was an example. He was rather serious, but by no means lacking in humor, a good camp-fire companion. In character enterprising, interested, upright.

Seemingly in good health, nevertheless for some years he had need of a surgeon, and in October submitted to an operation at a Chicago hospital. Unforseen complications developed and he died October 23, 1918. By his death conchology has lost one of its best explorers, and his associates a loyal and loving friend.—J. H. Ferriss.

JOSEPH WILLCOX.

Mr. Joseph Willcox, a member of the Board of Trustees of the Wagner Free Institute of Science for forty years, died in Philadelphia, October 1, 1918. Mr. Willcox was born at Ivy Mills, Delaware Co., Pa., August 11, 1829. After graduating from St. Mary's College, Baltimore, he became engaged in paper making with his father. This business was founded in 1729 by Thomas Willcox, who made paper for the continental

currency, the firm continuing to make paper for the government up to 1875. Mr. Willcox was in the Pennsylvania militia during the Civil War, and attained the rank of colonel.

On retiring from business Mr. Willcox took up the study of mineralogy and geology, and during his frequent visits to Florida became greatly interested in the geology of that State. In the spring of 1886, under the auspices of the Wagner Free Institute of Science, he organized with Prof. Angelo Heilprin of the Academy of Natural Sciences, an expedition to explore the gulf coast of Florida. Leaving Cedar Keys and proceeding south, they examined the silex beds of Tampa Bay, and in ascending the Caloosahatchie to enter Lake Okeechobee, discovered the Caloosahatchie Pliocene. An account of this expedition appeared in Transactions Wagner Free Institute, Vol. I. In company with Dr. Wm. H. Dall, he again visited these beds in the spring of 1887, and with the writer in 1888 made another trip to this and adjacent streams, making large collections to aid Dr. Dall in his great work on the Tertiary Fauna of Florida, also published in the Transactions of the Wagner Free Institute (Vol. III, six parts, 1654 pages, 60 plates, 1890–1903). In the work of obtaining additional material in other southern states and in many ways assisting Dr. Dall and others, he took great pleasure. On the various collecting trips he always obtained many undescribed species, of which some sixteen have been named in his honor. He made a large collection of Miocene and Pliocene shells and specialized on the genus Busycon (*Fulgur*) both recent and fossil. This collection he presented to the Academy of Natural Sciences.

For many years Mr. Willcox was Honorary Curator of the Isaac Lea collection of Eocene fossils at the Academy of Natural Sciences of Philadelphia. He was Chairman of the Committee on Museum of the Wagner Free Institute, and always took the greatest interest in the development of both institutions. A warm friend of Dr. Isaac Lea and Dr. Joseph Leidy, he lived to see the scientific work and progress of practically two generations. He is survived by a son, Mr. C. Percy Willcox, of Philadelphia.—C. W. Johnson.

NOTES.

NOTE ON THYASIRA BISECTA CONRAD.—In 1889 I gave an account of the microscopic anatomy of a species of *Thyasira* (under the name of *Cryptodon*) in my report on the Blake dredgings, p. 438. This was I believe the first general account of the unique features of this genus, the data on *Cryptodon* furnished by Pelseneer in the Challenger report relating to *Lyonsiella* or a similar genus rather than to *Thyasira*. Pelseneer himself referred them to "*Cryptodon*" with doubt. The specimen described in the Blake report was 17 mm. high, and regarded as exceptionally large. The species referred to *Thyasira*, under the name of *bisecta* Conrad, was so placed by me because of its agreement conchologically with that genus, although it had been referred to several different genera and a new genus had been proposed for it by Gabb.

I had long been anxious to examine the anatomy of this mollusk, which reaches a height of 75 mm., to see whether it conformed to the primitive features of the small typical forms of the genus, and by the kindness of Mrs. Oldroyd and Dr. Frye of the Friday Harbor Biological Station, Puget Sound, this wish has been granted. The specimen was found in about four fathoms, muddy bottom among the San Juan Islands.

Rather to my surprise I find that the description written of the small species nearly thirty years ago applies almost word for word to this giant of the genus. The only difference seems to be the greater proportional length of attachment of the W-shaped gills, and the only addition is the presence of a glandular area within the basal edges of the mantle extending nearly the whole length of the free edges. Something of this sort might have occurred in the earlier specimen but have been overlooked on account of its minuteness. The arborescent hepaticogenital organs occupy the greater part of the mantle cavity, while the absence of papillae on the mantle edge and around the efferent aperture in the mantle, and of oral palpi, the worm-like foot, etc., are essentially the same as in the smaller forms.

Geologically, *T. bisecta* recedes to the Miocene.—W. H. DALL.

Cuban Mollusks Colonized in Florida.—Last April Mr. C. T. Simpson sent me 10 fine *Pleurodonte auricoma* (Fér.) and 2 *P. marginella* (Gmel.), one adult and one immature, which he had collected in his "hammock" at Lemon City, Fla. The largest *auricoma* measures 40 x 29 and the smallest 30 x 20 mm. The adult *marginella* is 27 x 16 mm., while the young shell would probably have grown larger.

As these species appear to be permanently established I wrote for further information, and below give his response.—"Little River, Fla., April 20, 1918. I have *Pleurodonte auricoma* living on the place but cannot give locality from whence taken. It has become completely established and every year I find hundreds of living and dead examples scattered throughout my cultivated pine land, but never in the hammock. I find most of the living specimens when hoeing, buried just under the surface of the sandy soil, sometimes in dry weather with a sort of epiphragm. The other day I found a perfect var. *provisoria* in fine condition. I do not remember whence it came.

"Two varieties of *Liguus fasciatus*, which were derived from the general Camaguay to Holguin (Cuba) region, seem to be established here. The ground color of one is a warm slate and the other has some yellowish on it. I have found two specimens lately in fairly fresh condition and as it has been about four years since any were brought in I am sure they have grown here, especially as one was not fully grown.

"*Polymita muscarum*, white var. with dark dots, is occasionally seen and the dead shells are rarely found. J. B. Henderson sent the parents of these and they are from some part of Eastern Cuba. Our specimens are large, solid and fine.

"*Pleurodonte marginella* seems to be pretty well established in my hammock, probably from Cayo del Rey, and there are several variations. Most are bluntly keeled and rather dark colored. They keep strictly in the hammock and tho not yet numerous they seem to be spreading and slowly increasing. They remain under trash and the fallen leaves of palms during most of the dry season, but have just begun to appear since we had a heavy shower yesterday. They climb palms and live

oaks, sometimes to a height of seven feet and seem to be given greatly to breeding.

"I have introduced a number of other snails from Cuba and Bimini including some of the land operculates, but have never found living or dead specimens since. That does not prove that they may not be living, as it seems to take a long time for a species to become established. Until a short time ago I supposed that no Cuban *Liguus* were living in my hammock. I have none of the original stock of these that I can be sure of; I simply introduced the things for 'company' and not for any 'scientific results.'"

I think the above is well worth putting on record.—Geo. H. Clapp.

Some Rare Shells Collected in Puget Sound, Washington, During July, 1918.—Thinking it would be of interest to the readers of the Nautilus, I send you a short list of some of the very rare species we collected this summer at the Biological Station of the University of Washington at Friday Harbor, San Juan Island.

Thyasira bisecta Conrad.

This rare shell we dredged in mud in between 3 and 4 fms. Three live specimens and a few dead ones were obtained.

Macoma nasuta kelseyi Dall.

This species we found with the above; the specimens were larger than those from California.

Thracia curta Conrad.

One specimen of this species was obtained in 25 fms. between San Juan Is. and O'Neal Island.

Thracia trapezoides Conrad.

This species is the pride of the collection. So far as we have been able to find out, this has never been reported living. One living and two dead specimens were obtained in about 20 fms. off O'Neal Island. This with the first two are found in the Pliocene at San Pedro, Cal.

A fine species in the Naticidae may prove to be a new genus.

Velutina laevigata Linn.

The specimens we obtained were the largest and finest I have ever seen. The largest one is 8.2 mm. in length.

Panomya ampla Dall.

Of this odd and rare species we were fortunate to obtain several specimens.

A report will be published about April, 1919, and will have a full description of each species; and we hope to have figures of most of them.—Ida S. Oldroyd, Stanford University, California.

PUBLICATIONS RECEIVED.

Foreign Land Snails in Michigan. Occ. Pap. Mus. Zool. Univ. of Mich., no. 58. By Bryant Walker. The following are recorded:

Arion ater (L.), garden in Detroit, one specimen.

Arion circumscriptus Johns. "Cat Hole," near Ann Arbor.

Subulina octona (Brug.) and *Opeas clavulinum kyotense* Pils., conservatory in Lansing.

Vitrea lucida (Dr.), conservatory, Bell Isle Park.

Pleurobema clava (Lam.) and Planorbis dilatatus buchanensis Lea in Michigan. Occ. Pap., etc., no. 51. By Mina L. Winslow. *P. clava* was taken by the author in Hillsdale Co., the *Planorbis* near Harbert, Berrien Co. Excellent figures of *P. dilatatus* and *P. d. buchanensis* are given, with a bibliography of the species and notes on distribution.—H. A. P.

Molluscan Fauna from San Francisco Bay. By. E. L. Packard (Univ. of Cal. Publications, vol. 14, no. 2, pp. 199–452, pls. 14–60, 1918). This valuable publication is the results of the work of U. S. Steamer "Albatross," commissioned in Oct., 1911, by the Bureau of Fisheries to make a biological

survey of San Francisco Bay. A thorough study of the fauna of a given area presents many interesting facts pertaining to distribution, and a basis for making further observations. The number described are 173 species and 13 varieties collected by the survey or previously recorded from the San Francisco Bay, San Francisco Co., or the Farallon Islands. The number obtained by the survey within the limits of San Francisco Bay comprises 81 species and varieties. The illustrations are excellent, and charts show the local distribution of 18 of the more common species. A map of San Francisco Bay showing the dredging stations is also given.—C. W. J.

The Productivity of Invertebrate Fish Food on the Bottom of Oneida Lake with Special Reference to Mollusks. By Frank C. Baker (N. Y. State College of Forestry, Tech. Pub., no. 9, vol. 18, no. 2, 1918, pp. 1–264. A most interesting publication that brings to our attention a great factor little considered by most conchologists, *i. e.*, the importance of the smaller fresh-water mollusks as fish food. Animal life was found to be most abundant at the 6-foot contour and a sandy bottom the richest in animal life.—C. W. J.

A New Marine Mollusk of the Genus Cerithiopsis from Florida. By Paul Bartsch (Proc. Biol. Soc., Wash., vol. 31, p. 135, 1918). *Cerithiopsis vanhyningi*, Tampa Bay.

Four New Mollusks from the Philippine Islands. By Paul Bartsch (Proc. Biol. Soc., Wash., vol. 31, p. 153, 1918).

Changes and Additions to Molluscan Nomenclature. By W. H. Dall (Proc. Biol. Soc., Wash., vol. 31, p. 137, 1918). The following new generic and section names are proposed: *Tromina*, *Algaroda*, *Littorivaga*, *Algamorda*, *Boetica*, *Iselica*, *Elachisina*, *Kurtziella*, *Progabbia*, *Crawfordia*, *Boreomelon*, *Phenacoptygma* and *Atrimitra*.

The Homing Habits of the Pulmonate Mollusk Onchidium. By L. B. Arey and W. J. Crozier (Proc. Nat. Acad. Sci., vol. 4, pp. 319–321, 1918).

Growth and Duration of Life of Chiton tuberculatus and Growth of Chiton tuberculatus in Different Environments [2 papers]. By W. J. Crozier (Proc. Nat. Acad. Sci., vol. 4, pp. 322–328, 1918).

The Nayades (Fresh Water Mussels) of the Upper Tennessee Drainage, with Notes on Synonymy and Distribution. By A. E. Ortmann (Proc. Amer. Phil. Soc., vol. 57, pp. 521–626, 1918). Exhaustive studies of this character of the molluscan fauna of our rivers constitutes one of the most important works in biology. The constantly increasing pollution of our streams will locally exterminate many species. The author says: "The region in question is known as one of the chief centers of nayad development, and may be called the most prolific section of the world in this particular group." The species often assume different shapes in the larger rivers than in the smaller streams and headwaters. Some 88 species and varieties are recorded from this drainage.—C. W. J.

Los Moluscos de la Republica de Panama por James Zetek (Revista Nueva, Jul.-Aug., 1918). This catalogue of the mollusks is prefaced by a discussion of the distribution, peculiarities of the fauna, etc., and followed by a list of synonyms and a bibliography. Besides having many species additional to those of C. B. Adams's well-known catalogue, it has the advantage of modern nomenclature.

Cephalopoda, Australian Antarctic Expedition. By S. S. Berry. A new species of *Stauroteuthis* and four of *Moschites* are described and well figured in this interesting report.

L. E. DANIELS

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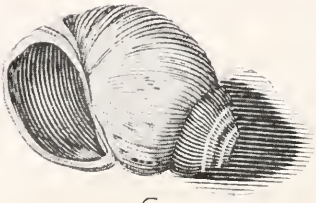

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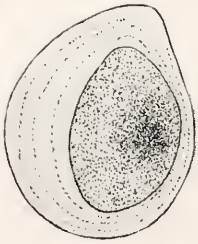

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BRYANT WALKER: PHILIPPINE VIVIPARIDÆ.

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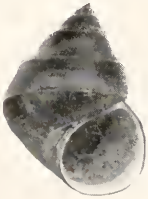

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BRYANT WALKER: PHILIPPINE VIVIPARIDÆ.

The Nautilus.

Vol. XXXII. APRIL, 1919. No. 4

NOTES ON CERTAIN PHILIPPINE SPECIES OF VIVIPARUS.

BY BRYANT WALKER.

Several months ago Mr. Walter F. Webb, of Rochester, N. Y., placed in my hands for identification a small collection of Philippine *Vivipari*. The very considerable search of the literature that was found necessary to determine the proper names to be used for certain species has brought about some interesting results in the matter of nomenclature.

I.

PALUDINA (VIVIPARA) CARINATA Auct.

No less than four distinct species have been described by as many different authors as *Paludina carinata* or *Vivipara carinata*, viz:

1820–3. *Paludina carinata* Swainson. Ganges.
1827. *Paludina carinata* Valenciennes. Mexico.
1863. *Paludina carinata* Reeve. Philippine Is.
1867. *Vivipara carinata* Bartsch. Philippine Is.

It will be more convenient to treat these species separately.

II.

PALUDINA CARINATA Sw. Pl. VIII, fig. 1.

Paludina carinata Swainson. Zool. Ills., Series I, 1820–3, pl. 93, center figure.

Swainson's original figure is reproduced as above and his brief description is as follows:

"*P. testa parva, olivacea; spira apertura longiore, apice obtuso, rufo; anfractu basili medio leviter carinato; umbilico obsoleto.*

"Shell small, olive; spire longer than the aperture; the tip obtuse, rufous; basal whorl slightly carinated in the middle; umbilicus obsolete.

"A distinct species which is never found larger than the figure. I once saw near 100 which had been picked up on the banks of the Ganges; the spire is rather lengthened, always obtuse, and the umbilicus even less than the last" (*P. unicolor*).

No measurements are given, but the figure (there is only one) measures: alt. 21, diam. 16 mm.

This species seems to have entirely dropped out of sight in recent years. It has been referred to *V. dissimilis* (Müll.) by Mörch (Cat. Yoldi, 1852, p. 52), Troschel (ubi?) and von Martens (Mal. Blätt., 1865, p. 148). Frauenfeld (Verzeichniss, Paludina, 1864, p. 584) referred it to *V. remossii* (Phil.). Hanley and Theobald (Con. Ind., 1876; p. xvii, n. 7) simply give the above opinions. The species is not referred to by Kuester (Con. Cab., Paludina, 1852) nor by Reeve in the Conchologia Iconica (1863) except as hereinafter stated, nor by Kobelt in his recent (1906–9) monograph in the Conchylien Cabinet, nor by Bartsch (Pr. U. S. Nat. Mus., XXXII, 1907, pp. 135–150), nor by Preston in "The Fauna of British India" (1915).

But it is clear that Swainson's species was an Indian one and, whatever may be its standing at the present time in the Indian fauna, it is entirely different from any Philippine species and by its priority prevents the use of the name by any subsequent author either in *Paludina*, *Vivipara* or *Viviparus*.

III.

PALUDINA CARINATA Valenciennes.

See No. X.

IV.

PALUDINA CARINATA Reeve.

Paludina carinata Reeve. Con. Icon., Paludina, 1863, Sp. 53, pl. IX, fig. 53.

Reeve in his text gives no authority for the specific name and

the species is usually credited to him, but in the index the species is credited to Swainson. It is possible that he thought that the shell that he described and figured was the same as Swainson's species. Frauenfeld (Verzeichniss, Paludina, 1864, p. 584) expresses the opinion that Reeve's species is really the same, but the figure, description, such as it is, and the locality, if correct, renders it quite improbable.

I do not think either that the shell figured by Bartsch as this species is really the same.

Reeve as usual gives no dimensions, but his figure measures: alt. 25, diam. 20; aperture, alt. 13.5, diam. 12 mm.

The type, said by Reeve to be in the Cuming Collection, seems to have been lost or mislaid as Mr. H. C. Fulton, who made a search for it at my request, was unable to find it at the British Museum.

I have before me four shells that I believe represent this species and which are figured on pl. IX, figs. 1–4. Two (figs. 1 and 2) are from the Andrews collection and were sent to Mrs. Andrews by Dr. Wesley Newcomb as *V. amplior* Rve., and as from the Philippine Islands. They are clearly not Reeve's *amplior*, which Frauenfeld (Verzeichniss, p. 569) considers the same as Mousson's *V. lineolatus amplus* and Kobelt (Con. Cab., Viviparidae, 1908, p. 260) calls a variety of *V. javanicus*.

The third specimen (fig. 3) is No. 3252 of the collection of the Museum of Zoology, University of Michigan, and formed a part of the collection of Joseph Monds, of Salem, Mass., purchased by the University in 1855. It was originally unnamed and is labeled "Manilla."

The fourth (fig. 4), (Coll. Walker, No. 31774) was part of the Quadras collection and has his original label "*Pal. carinata* Rve., Rio Pasig, Manila." With it was a larger shell of apparently a different species.

As Reeve's type has disappeared, I propose to call the species represented by these specimens *Viviparus pseudocarinatus*, fig. 1 being the type and the others paratypes. If Reeve's type should be found and prove to be identical, his specific name will be superseded by *pseudocarinatus*.

Viviparus pseudocarinatus may be described as follows: Shell

globose-conic, apex obtuse, narrowly but deeply, umbilicate; whorls five; apical whorls dark purple, which after the third whorl becomes lighter and gradually fades into a yellowish-green on the body-whorl; the dark color of the upper whorls is lighter towards the sutures; on the last half of the body-whorl of Nos. 1 and 3 are several darker, longitudinal strigations representing, probably, rest periods. The lips of Nos. 1 and 2 are sharp and uncolored, having been taken apparently between rest periods; No. 3 has the remains of a dark brown or blackish margin on the lip, and on No. 4 the lip is thickened and deep black. All four shells are quite acutely carinated on the periphery of the upper whorls and in the three larger ones the body-whorl drops slightly below the carina of the preceding whorl and exposes it above the suture, but the carina rapidly diminishes in prominence and is practically obsolete before reaching the lip, which is regularly rounded. The lines of growth are regular but very light, and the entire surface is covered with exceedingly fine, spiral striæ, scarcely discernible on the upper whorls, but becoming stronger on the base of the body-whorl; these lines especially on the upper whorls are more or less interrupted by the growth lines giving the appearance of very minute punctations.

The four shells measure as follows:

No. 1, alt. 22.5, diam, 17.5; aperture, alt. 12.8, width, 11.4 mm.

No. 2, alt. 20.00, diam. 14.5; aperture, alt. 11.2, width, 8.9 mm.

No. 3, alt. 22.1, diam. 17.1; aperture, alt. 13.0, width, 10.0 mm.

No. 4, alt. 16.9, diam. 12.8; aperture, alt. 9.6, width, 8.4 mm.

Unfortunately No. 4 is the only one with its operculum. This (Pl. 8, fig. 7) is like that of *V. costatus* (Q. and G.) in having the inner surface divided into three distinct areas with the central and outer portions smooth and polished, but it differs from that species in having the intermediate area without granulation, it being finely and concentrically striate.

V.

VIVIPARA CARINATA Bartsch. Pl. IX, fig. 5.

Vivipara carinata Bartsch. Pr. U. S. Nat. Mus., XXXII, 1907, p. 141, pl. XI, fig. 14.

As already stated I do not think that the shell figured by Bartsch as *carinata* Rve. is really that species. Bartsch's specimen apparently belongs to a larger, more elongated species and, if mature, lacks the black peritreme that seems characteristic of *carinata* Rve. The color is also different.

The specimen that I have figured for comparison with what I believe to be the genuine *carinata* Rve. and which seems to agree very exactly with that figured by Bartsch, was sent by Dr. Wesley Newcomb to the late Mrs. George Andrews with another, which was correctly named as *V. cumingii* Rve. It is No. 47035 Coll. Walker and measures: alt. 28.5, diam. 21.7; aperture, alt. 16.2, width 13.1 mm.

As "carinata" can not be used for either Reeve's or Bartsch's species and the two are evidently different, the better course would seem to be to rename the form figured and described by Bartsch and to leave Reeve's *carinata* to stand for further consideration. I would propose that the species figured and described by Bartsch be called *V. bartschi*, the type being No. 103666, U. S. Nat. Museum.

VI.

PALUDINA CUMINGII Reeve. Pl. IX, fig. 7.

Paludina cumingii Reeve. Con. Icon., Paludina, 1862, Sp. 11, pl. III, fig. 11.

This species will also have to be renamed, as "*Paludina cumingii*" was used by d'Orbigny in 1835 for the South American species now known as *Littoridina cumingii* (d'Orb.). Reeve himself says that the name had been used by d'Orbigny, but attempts to avoid the duplication by stating that d'Orbigny's species is a *Paludestrina*. This, of course, is impossible under the international code.

To make the change as inconspicuous as possible, I would propose that the species hereafter be known as *Viviparus cumingianus*.

Cumingianus is a large, well-marked species and was excellently figured by Reeve. It was the first of the more-widely umbilicated Philippine species to be described and is not likely to be confounded with any of its contemporaneous species.

The characteristic specimen figured is from the MacAndrew collection (Coll. Walker, No. 46916) and measures: alt. 39.7, diam. 30.5 mm. Another with it measures: alt. 36.5, diam. 29 mm. This specimen has its operculum, which is of the characteristic *javanicus* type.

The specimen figured by Bartsch (Pr. U. S. N. M., XXXII, 1907, pl. X, fig. 7) is apparently immature as it measures only alt. 17.1, diam. 14.8 mm.

Autoptically unknown to Frauenfeld, von Martens and Kobelt, the first two express no opinion in regard to it, but the latter (Con. Cab., Viviparidae, 1908, p. 273) thinks that it is probably a thick-shelled variety of *V. costatus* (Q. and G.); but that view is not tenable.

VII.

VIVIPARUS ANGULARIS (Müller). Pl. VIII, figs. 4–5.

Nerita angularis Müller. Hist. Verm., II, 1774, p. 187.

Helix angularis Chemnitz. Con. Cab., IX, 1786, p. 160, pl. 134, figs. 1222–1223.

Müller's description of his *Nerita angularis* is as follows:

"*Nerita testa imperforata, virescente, anfractibus spiraliter angulatis, fauce alba.*

"*Cochlea virginiana e flavo viridescens non fasciata.*"

"List. Syn. t. 127, f. 27.

"Dan. Kant-neriten

long. 12 lin. lat. 6 lin.

"*Testa opaca, conica, glabra virescens striis transversis subtillimis, spiralibus tribus in singulo anfractu elevatis, acutis. Anfractus quinque prope perpendiculares.*

"*Apertura retundata, ad anfractum vicinum in angulum producta. Foramen vel umbilicus nullus. Faux calcarea. Striæ spirales in quibusdam evanescunt.*

"*Figura Listeri nostris major, caeterum refert. In flumine Chinensi emporium Canton alluente.*"

His reference to Lister was an unfortunate one as the two species have nothing in common. Chemnitz in 1786 expressed his surprise at the approximation. Lister's species was undoubtedly that subsequently described by Say (1817) as *Limnæa decisa* and now known as *Campeloma decisum*. As the facsimile of Lister's figure given by Binney (L. and F.-W. Shells, III, 1865, p. 43, fig. 86) is not a satisfactory reproduction of the original figure, I give a photographic copy on pl. VIII, fig. 6.

As to whether Müller's species was the Chinese species commonly known as *V. quadratus* (Bens.) or the Philippine species often referred to *V. costatus* (Q. and G.), there has been a very radical and long-continued difference of opinion among conchologists.

Mousson in 1849 (Moll. Jav., p. 62) according to von Martens (Moll. Weber, 1897, p. 21) recognized that the shell figured by Chemnitz as *Helix angularis* was different from that figured by Philippi as *Paludina angularis*, but overlooked the fact that it was the *P. quadrata* of Benson.

Philippi (Abbildungen, I, 1845, pl. I, fig. 10) identified it with the species described by Quoy and Gaimard in 1832 as *P. costata*.

Kuester (Con. Cab., Paludina, 1862, p. 26) followed Philippi.

Reeve (Con. Icon., Paludina, 1862) referred the Philippine species to *angularis*, which he considered distinct from *costata*, though he remarks that the two species are very closely allied.

Frauenfeld in 1864 (Verzeichniss, Paludina, p. 571) also referred the Philippine species to *angularis*.

Von Martens in 1869 (Mal. Blätt., p. 145) seems to have been the first to refer Müller's species to the well-known Chinese form commonly called *quadrata* Bens.

Morelet in 1869 (J. de Con., XVII, p. 403) argued the question at considerable length and refused to follow von Martens. But he makes no reference to Chemnitz either in his synonymy or in his discussion.

Issel in 1874 (Moll. Born., p. 90) followed von Martens.

The Sarasins (Suessw. Moll. Celebes, 1898, p. 59), while they make no reference either to *angularis* Müll. or to *quadrata* Bens., refer the Celebes species to *costata* Q. and G. and therefore impliedly endorse von Martens' position.

In 1897 von Martens (Moll. Weber, p. 20) reaffirmed his position of 1865.

Bartsch in his monographic paper on "The Philippine Pond Snails of the Genus Vivipara" (Pr. U. S. Nat. Mus., XXXII, 1907, pp. 135–150) followed Philippi and referred the Philippine species to *angularis* Müll.

Kobelt in his recent monograph of the Viviparidæ (Con. Cab., 1908, p. 230) adopts von Martens' position and calls the Philippine species *costata* Q. and G. But while he states (l. c. p. 122) that in his opinion the smaller, spirally-sculptured Chinese species should be divided into groups represented by *angularis* Müll. and *quadrata* Bens., he retains Benson's name for practically the whole Chinese series and neither figures nor describes, except in a very general way, the particular Chinese form that he would consider to be the real *angularis*.

None of the above-mentioned authors with the exce' tion of Philippi, Kuster and von Martens, refer in any way to the figures and remarks of Chemnitz in the original Conchylien Cabinet. If they were acquainted with that work they omitted to make any reference to it, and if they were not it is difficult to understand how they came to refer *costata* Q. and G. to Müller's species.

I am indebted to Dr. Pilsbry for the reference to Chemnitz, the photographs of his figures reproduced on pl. VIII, the translation of his remarks and for permission to use the illuminating note that follows.

The translation is as follows:

"Tab. 134. Fig. 1222. 1223.

"Ex Museo Spongleriano.

"The greenish river-snail with three-fold keels on each whorl.

"*Helix angularis, testa conica, viridescente, in quovis anfractu tricarinata, apertura rotunda subangulari.*"

Müller, Histor. Verm. no. 373, p. 187.

Then follows Müller's diagnosis.

"This river snail is covered with a dark green coat. It has a quite conic formation, and a mainly circular, but still somewhat angular, aperture. It will be most conspicuously and

recognizably distinguished from other snails by the three white angles or perceptibly raised, parallel, transverse striæ, which are seen upon the whorls. Because it is seen to be thus somewhat angular in its formation and aperture, our renowned Müller has called it *Cochleam angularem*. It lives in the Chinese rivers, has a length of only sixteen lines and is certainly unknown at present to most lovers of shells; hence it is rare and uncommon. I do not comprehend how Müller could find it like the figure of Lister, tab. 127, no. 27, which he refers to in his Hist. Verm."

Dr. Pilsbry adds: "Müller's *angularis* does not depend upon Lister, he notes a discrepancy in size. I have therefore had Chemnitz's figures copied. Nearly all of Müller's exotic shells were from the Spengler collection, and there is every reason to believe that Chemnitz figured one of the type lot from the same collection."

It is only necessary, in addition, to compare Chemnitz's figures with a typical specimen of *quadrata* Bens. from China (Coll. Walker, No. 46135) figured on pl. IX, fig. 10, and Quoy and Gaimard's figures of the Celebes type of their *costata* (pl. VIII, figs. 9–10) to come to the conclusion reached by von Martens.

Morelet's remark (l. c. p. 407) that *Paludina quadrata* is distinguished by its more elongated form, less shouldered spire and a proportionately smaller aperture is a very apt statement of the difference between Chemnitz's and Quoy and Gaimard's figures and practically convicts him out of his own mouth.

To which of the many described forms of the protean Chinese species, *angularis* should be referred is "another story" and outside the purview of this paper. But there can be no doubt but that Müller's specific name should be associated with the Chinese rather than with the Philippine species.

VIII.

VIVIPARUS COSTATUS (Quoy and Gaimard). Pl. VIII, figs. 9–13. Pl. IX, fig. 6.

Paludina costata Quoy and Gaimard. Voy. Astrolabe, III, 1832, p. 170, pl. 58, figs. 1–5.

Type locality: Lac de Tondano, N. Celebes.

It is not entirely certain that Quoy and Gaimard's name can be retained for this species.

Frauenfeld (Verzeichniss, Paludina, 1864, p. 571) has considered it to be the same as Lesson's *P. tricostata* from New Guinea described in 1830 (Voy. Coquille, Zool., II, p. 349).

Von Martens (Moll. Weber, 1897, p. 21) has also made the same suggestion. If so, Lesson's name would have priority.

Lesson did not figure his species, but his description may be translated as follows:

"Shell conic, inflated, of a uniform yellowish-green color, ornamented with vertical striæ, very fine and very close together. Spire moderate, conic, acute, with convex whorls separated by a linear and excavated suture. The fifth whorl is the largest, inflated and dilated, three prominent keels mark its contour, beginning on the preceding whorl. These three light lineations form a ribbon-like, flat carina. The aperture is as high, as wide, rounded, with a thin, sharp lip and smooth on the columellar border, thickened a little at its base by a small lamella, which covers in part the narrow umbilicus.

"Several individuals in all respects alike were 7 lines in height and 6 in diameter. This Paludina inhabits the sweet, fresh waters of the brooks of New Guinea."

While in some respects this description would apply to *V. costatus*, the dimensions given, alt. 17, diam. 15 mm., if from mature specimens, would indicate a much smaller and more globose species and his statement that the three lirations form a flat, ribbon-like (*rubanée et aplatie*) carina would seem to indicate that they were close together and, probably, at the periphery of the shell.

Moreover, Tapparone-Canefri (Fauna Moll. N. Guinea, Pt. I, 1883, p. 23) states that Beccari and d'Albertis found nothing like it in their collections. On the other hand, Pilsbry in commenting on another of Lesson's lost species, *Partula lineata* (Man. Con., XX, 1909, p. 312), remarks on "the general reliability of the locality records in the Zoology of the Coquille."

Thinking that possibly Lesson's type had been preserved in the Paris Museum, I requested Dr. Louis Germain to ascertain

whether they were in the Museum. But he replied that much of their collection and nearly all of their types had been stored in the cellars for safety and that consequently the desired information could not be obtained at present. Now that the war is over, the Museum collections will, no doubt, be returned in due time to their normal condition and then, if the original types have been preserved, a critical examination can be made.

In view of the uncertainty as to just what Lesson's species is, it does not seem to be desirable to change the well-known and unquestioned name for the species until more definite information can be had in regard to the earlier one.

Viviparus costatus (Q. and G.) came from Lake Tondano, North Celebes and is described as being "very ventricose, fragile and thin, spire obtuse, whorls rounded, carinated by a considerable number of acute lirations, of which two or three are more prominent, and very finely longitudinally striate. Aperture almost circular, slightly angled above, umbilicus narrow and deep. Length 27.66, diam. 22.56 mm."

As shown by the original figures copied on pl. IX, figs. 9–10 and fig. 6 on pl. X from a specimen from Sukur, Celebes, labeled "*angularis* Müll." by Brot, the shell has two principal carinas, one at the periphery and the other forming the edge of the prominent, wide shoulder; between these are a number of lesser lirations, of which two are usually somewhat stronger than the others. The penultimate whorl is much smaller than the body-whorl owing to the width of the shoulder, and the spire is short and obtusely conical.

I have not seen any typical *V. costata* from the Philippine Islands.

Kobelt (Con. Cab., Viviparidæ, 1908, p. 230) has called attention to the fact that the shell figured by Bartsch (Pr. U. S. Nat. Mus., XXXII, 1907, pl. X, fig. I) from Luzon as typical "*angularis*" (*costatus*) does not represent the type from North Celebes. It was very properly united with *V. burroughianus* by Bartsch and will probably, when large series are obtained, be found to intergrade with it quite completely, but at present, at least, it seems entitled to varietal rank.

IX.

VIVIPARUS BURROUGHIANUS (Lea).

Paludina burroughiana Lea. Trans. Am. Phil. Soc., V, 1834, p. 113, pl. XIX, fig. 80; Obs.. I, 1834, p. 225, pl. XIX, fig. 80.

Paludina angularis Reeve. Con. Icon., Paludina, 1862, Sp. 14, pl. III, fig. 14.

Vivipara angularis burroughiana Bartsch. Pr. U. S. Nat. Mus., 1907, p. 136, pl. X, fig. 1.

Vivipara costata burroughiana Kobelt. Con. Cab., Viviparidæ, 1908, p. 232, pl. 46, figs. 7–8.

This is a characteristic species of the Philippine Islands. It differs from the *V. costatus* from Celebes by its larger size, more sloping shoulder, more elevated spire and stronger carination. As the oldest available name Lea's becomes the specific designation.

X.

VIVIPARUS BURROUGHIANUS TRINOMINIS n. n.

Paludina carinata Valenciennes. Rec. d'Observ. de Zool., 1833, p. 252, pl. LVI, figs. 2a–b; Haldeman, Mon., 1841, p. 27, pl. VIII; Kuster, Con. Cab. Paludina, 1852, p. 28, pl. VI, figs. 6–7; *non* Swainson, 1820–3.

Paludina multicarinata Haldeman. Mon., 1842, Pt. 4, p. 4 of cover; W. G. Binney, L. and F.-W. Shells, Pt. III, 1865, p. 22, fig. 40; *non* Cailliaud, 1826.

Vivipara angularis Bartsch. Pr. U. S. Nat. Mus., XXXII, 1907, p. 135, pl. X, fig. 1; *non* Müller, 1774.

Valenciennes states that his species came from Mexico, but W. G. Binney (J. de Con., XV, 1867, p. 430), and Morelet (*Ibid.*, XVII, 1869, p. 405) from an examination of the types have confirmed the opinions of Frauenfeld (Verzeichniss, Paludina, 1864, p. 583) and von Martens (Mal. Blätt., 1865, p. 149) that it is undoubtedly the Philippine species commonly known as *V. costatus* (Q. and G.). The author himself states that his specimens were given to Humboldt by a member of the Royal Council of Manilla. Valenciennes' figure copied by

Haldeman is almost exactly the same as that given by Bartsch (l. c.) as the typical form of *V. angularis* (Müll.).

Haldeman's name was proposed on account of the priority of *Paludina carinata* Sw., but *multicarinata* has already been used by Cailliaud (Voy. Meroe, 1826, pl. IX, fig. 6) for another species, so that it is not available at the present time even in a varietal sense.

None of the earlier names proposed for this form being available and, as in the light of our present knowledge, the race seems worthy of varietal recognition, a new one is given as above.

Frauenfeld (Verzeichniss, Paludina, 1864, p. 571) considers this form as the same as *tricarinata* Ant., but if the figures given of that species by Philippi and Kuester correctly represent it, it is quite different.

XI.

VIVIPARUS TRICARINATUS (Anton).

Paludina tricarinata Anton. Verzeichniss, 1839, p. 52.

Anton did not figure his species and I have not been able to consult his original description. Kuester (Con. Cab., Paludina, 1852, p. 27) considered it to be a variety of *angularis* Müll. (*costatus* Q. and G.) "differing only in the sharper carinæ, two on the upper whorls and three on the last," and remarks that every gradation between the two forms is to be found.

Tricarinata is not mentioned by Reeve in the Conchologia Iconica nor by Kobelt in his recent monograph in the Conchylien Cabinet.

I have not seen any Philippine specimens that are referable to this species, but Bartsch's *zamboangensis* evidently groups with it, if we are justified in assuming that Kuester's figure (pl. 6, fig. 5), which he gives as a "mittelform" in the series between the typical form and the variety, fairly represents the species.

I have two specimens in the James Lewis collection (Coll. Walker, No. 12553) from Celebes (pl. IX, fig. 11), which agree fairly well with Kuster's figure above mentioned. They differ from typical *costatus* by their more elevated form, the sloping

shoulder of the whorls and in the accentuation of the three principal carinas.

Philippi's figures of *tricarinatus* copied on pl. VIII, figs. 2–3, are not quite so much elevated and look not unlike *V. javanicus luzonicus* as figured by Kobelt (pl. 46, fig. 9) and herein. Philippi notes several minor differences between his specimens and Anton's description, but "has no doubt" but that his shells are correctly identified.

In the absence of specimens with their opercula, the standing of Anton's species and its relations to both *costatus* and *javanicus* must remain uncertain.

XII.

Viviparus javanicus luzonicus Kobelt. Pl. IX, fig. 8.

Vivipara javanica luzonica Kobelt. Con. Cab., Viviparidæ, 1909, p. 378, pl. 46, figs. 5, 9 and 10.

The Sarasins (Suessw. Moll. Celebes, 1898, p. 59) were the first to call attention to the radical difference in the opercula of the two species, *V. costatus* Q. and G. and *V. javanicus* v. d. Busch, which in their shell characters are often quite indistinguishable.

In *javanicus* and its allies the central part of the inner side of the operculum is occupied by a granulated area, which is surrounded by a smooth, polished border.

In *costatus*, on the other hand, the central portion is smooth and polished, but is surrounded by a narrow, distinctly granulated area and outside of this the remainder of the surface is smooth and polished like the centre.

Kobelt (l. c.) has described a race from Daraga, Luzon, which has the typical *javanicus* operculum, but in other respects closely resembles *costatus*. I have similar specimens with their opercula, figured above, which were collected in the Philippines by Steere, but no exact locality is given.

Among the shells received from Mr. Webb was a single specimen from Panique, Tarlac Prov., Luzon, which agrees in its shell characters with the Steere specimens, but unfortunately has no operculum.

If Anton's *tricarinata* should prove to be identical with this form, his name would have priority.

XIII.

VIVIPARA ZAMBOANGENSIS Bartsch. Pl. VIII, fig. 8.

Vivipara zamboangensis Bartsch. Pr. U. S. Nat. Mus., XXXII, 1907, p. 137, pl. XI, fig. 19.

This species was also collected by Steere many years ago at Zamboanga. The operculum (fig. 8) shows that it belongs to the *javanicus* group. I have also received it from the Geneva (Switzerland) Museum, but without exact locality, labeled "*angularis* Müll." by Brot.

A single specimen (pl. IX, fig. 9) from Bugasong, Antique, Panay, was received from Mr. Webb, which resembles the typical form in shape, but differs in the details of the carination. The peripheral and shoulder keels are as in the type, but the central one has disappeared and the space between the two that remain is divided by four lesser keels, of which the two in the middle are a little more prominent; the whole surface is very finely, spirally lirate as in the type but rather stronger. The lip is black-edged and bluish-white within. The apical whorls are dark purple, which passes into a yellowish-green on the intermediate whorls and become a darker green on the body-whorl. The umbilicus is as in the typical form.

This form may be called *V. zamboangensis duplocinctus.*

The type (No. 45204 Coll. Walker) has $5\frac{1}{2}$ whorls and measures: alt. 25.2, diam. 17.2 mm.

I am indebted to Dr. Pilsbry for photographic copies of Lister's description and figure and also of *P. carinata* Sw. and *N. angularis* Müll. And to Miss Mina L. Winslow of the Museum of Zoology, University of Michigan, for the reproduction of Philippi's figures of *P. tricarinata* Ant.

SUPPLEMENTAL NOTE.

Since the foregoing paper was written I find that Bavay found the original and unique type of *Paludina tricostata* Lesson in the Museum of Paris and figured it in his paper on the "Land and Fresh-Water Shells of New Guinea" (Nova Guinea, 1908, p. 270, pl. XIV, fig. 1). Unfortunately he added nothing to the meagre description of Lesson, but contented himself with giving an apparently excellent, life-size figure. Although

he followed von Martens in considering it identical with *P. costata* Q. and G., I do not think that the figure in any way supports his conclusion. As shown by his figure, *tricostata* is a small, globose form with two visible carinas, the upper one scarcely more than a strong angle, the peripheral one is well developed, the third (and intermediate?) one, if it exists, is not shown in the figure.

Bavay associates with this as varieties two forms, one much larger and the other about of the same size, both of which are much more strongly carinated and have a funicular umbilicus surrounded with a strong carina. *Tricostata* has no indication of an umbilicus of this form and no umbilical carina. Bavay's varieties are certainly clearly distinct from *costata* and apparently so from *tricostata.*

Lesson's type came from Lac Sentani at Ase.

So far as can be determined from Bavay's figure *tricostata* is apparently specifically distinct from *costata* and Quoy and Gaimard's name should be used for the species described by them.

A HAWAIIAN FORM OF TAPES PHILIPPINARUM.

BY WM. ALANSON BRYAN.

From a reliable native fisherman I learn that this species of clam was plentiful at a certain locality in the mud-flats at Ewa, on Oahu, more than thirty years ago, but that it apparently completely disappeared from that locality. The native name "Okupi" was commonly used for the species then though more recently the name "Mahamoi" is sometimes used to distinguish it from the more common edible "Olepi" (*Tellina rugosa* Born).

The story given in accounting for the unusual nature name "okupi," which means leg-weary, tired or exhausted, is that "a long time ago a native chief with his family and attendants, while spending a day at the seashore, accidentally discovered this clam as they were wading in the soft oozie black mud, deposited in the estuary of the stream. None of them knew a name for the clam; no one had ever seen it before; it was a new

comer and a stranger to the oldest inhabitants. After wading about in the sticky mud for a time and having gathered a quantity of the shells, the company, exhausted from their labor, sat down on the shore to rest. It was decided that the chief must name the *malihini* (stranger). Being a stout man and not accustomed to such strenuous labor as he had just been engaged in, he declared that the name of the new clam should be "okupi."

A few hours spent collecting specimens was sufficient to convince me that the name was most appropriately bestowed.

The species seems to be entirely restricted to brackish water mud-flats and is easily killed by either fresh or sea water. My native informant states that after the okupi had been abundant for several years during his youth, there came a period of very heavy rain which flooded the lowlands about his home in Ewa. After the flood went down there was not one of this species of clam alive in that locality. Although he is a professional fisherman he had not seen the clam either in Ewa or at Kalihi (where he had resided since 1886) until a few months ago, when the natives began to secure them in quantity from the Kalihi and Moanalua mud-flats, not a mile distant from his home.

In a large series of 456 specimens 68 have deep purple interiors; 374 bluish-white and 14 are from yellow to salmon colored, the proportions remaining the same in full grown and immature shells. When this clam is cooked the varied dark greenish-brown or purple-brown markings[1] change to a rich chestnut (or between russet and cinnamon-brown of Ridgeway) but the interior of the shell is not affected. The majority of the colored figures of this genus that we have examined are apparently made from sun-bleached shells or those that have been opened in hot water and accordingly do not show the color as in life.

While these shells agree in the main with the figure and description of *Tapes philippinarum*, and with Japanese specimens they differ by the somewhat larger size and bolder markings. It may be as well to have a varietal name, *Tapes philippinarum okupi*, for the Hawaiian form.

[1] Bone-brown to clove-brown in the dry shells.

A NEW EPIPHRAGMOPHORA FROM THE COAST RANGE OF CALIFORNIA[1]

BY PAUL BARTSCH.

Epiphragmophora indicata colusaensis, new subspecies.

Shell depressed helicoid, pale brown with an olive tinge above and olive with a brownish tinge below, provided with a narrow chestnut-brown supraperipheral spiral band which is fringed on each side by a narrow zone a little lighter than the ground color; inside of the aperture and the slightly reflected lip, pale purplish, the spiral brown band and its bordering lighter zones well marked. Nuclear whorls one and three-fourths, well rounded, minutely granulated; the succeeding turns marked by more or less regular obliquely retractively curved riblets, which are about half as wide as the spaces that separate them. The last turn shows a few irregularly distributed malleations on the upper surface. Base narrowly umbilicated, the umbilicus about half covered by the reflected columella. The under surface of the whorls are well rounded and marked by the continuations of the axial riblets which extend feebly into the umbilical area, becoming crowded in this region. The peripheral half of the base shows numerous malleations while the umbilical half is almost devoid of them. Immediately behind the reflected peristome there is a concentration of fine pustules which are densely scattered over about one-twentyfifth of the last whorl: within the umbilicus they extend back a little farther covering probably a tenth of a turn. Aperture large, very broadly oval; peristome slightly reflected, inner lip decidedly reflected, parietal wall covered by a thin callus.

The type, Cat. No. 334721, U. S. N. M., and two additional specimens were collected by Mr. G. Willett "in an old rock slide on the north slope near the summit of a hill about a mile southeast of Sites, Colusa County, California, January 29, 1919," that is, on the east slope of the coast range north of San Francisco Bay. The type has 5¼ turns and measures: altitude 15 mm., greater diameter 24.4 mm., lesser diameter 19.6 mm.

[1] Published by permission of the Secretary of the Smithsonian Institution.

WHITTAKER: VARIATION IN PLANORBIS CAMPANULATUS

The largest of the three specimens, a dead individual, measures: altitude, 16 mm.; greater diameter 27.1 mm.; lesser diameter 21.2 mm.

No race of *Epiphragmophora tudiculata* appears to have been described from that general region. The general form and the weak malleations of the surface distinguish this race from the other members of the *tudiculata* group and strongly suggest *Epiphragmophora traski*, but the nuclear characters as well as the other sculptural features all ally it with the *tudiculata* complex.

NOTES ON VARIATION IN PLANORBIS CAMPANULATUS SAY, FROM BLUE SEA LAKE, QUEBEC.[1]

BY E. J. WHITTAKER.

Variability in *Planorbis campanulatus* is much less common than it is in a related species, *P. trivolvis*, in which variation with reference to size and aperture of the shell has resulted in many varieties being established by conchologists. The shell in *P. campanulatus* may vary in size in certain localities, due to differences in bottom environment and food supply, but in the same area the form is apt to be constant. While at Blue Sea Lake, Wright County, Quebec, about eighty miles north of Ottawa, in the summer of 1918, the writer secured a large series of *P. campanulatus*, in which several well-marked deviations from the normal type were observed.

Previous Observations.

Various observations have been made on variation in this species among which are the following:

Tryon[2] remarks: "The plan of the spiral in this genus (*i. e.* Planorbis) is such as to yield readily to pressure, hence monstrosities are rather frequent. This consists of a tilting-up of the whorls on one side, or even a conical elevation of the spire. The smaller forms appear to be most liable to this distortion."

[1] Published by permission of the Director of the Geological Survey of Canada.

[2] Tryon, Geo., Jr., Manual of Conchology, vol. 3, p. 106.

Dall[1] remarks of *P. campanulatus rudentis:* "Very similar specimens were obtained from Anticosti, and from Marl Lake, Michigan, in which the coil is even more irregularly wound, a condition I take to be pathological."

Bryant Walker[2] remarks of *P. multivolvis:* "When it (*i. e.* the abnormality) occurs, it bears the appearance of an abnormal extension of the last whorl being more or less irregular in form and usually deflected from the plane of the rest of the whorls;" and adds that occasionally *P. campanulatus* has a similar abnormality. This would appear to be the closest approach to No. 8 in the plate accompanying this paper.

Dr. Frank C. Baker[3] describes *P. campanulatus smithii.* This species would seem to be very similar, with regard to the deflection of the last whorl, to the ones discussed here, but the whorls of that variety are "strongly carinated above and below, the last whorl being particularly so marked." This serves to distinguish the forms. Mr. Baker observes, however, as in the specimens from Blue Sea Lake, the presence of the typical form of *P. campanulatus* which shows marked variation toward the *smithii* type.

Robertson[4] states: "Often distorted so that the tops of the whorls are inclined at various angles. Varies considerably in the length of campanulate expansion and thickness of shell." This is of interest because the area, which his report covers, lies within the Archaean region of Georgian Bay, where similar conditions to those at Blue Sea prevail.

Tryon[5] describes and illustrates an abnormal specimen of *Planorbis bicarinatus,* which has developed in exactly the same

[1] Dall, W. H., Land and Fresh-Water Mollusca, Harriman Alaska Expedition, vol. XVIII, p. 90.

[2] Walker, B., Mollusca of Michigan, NAUTILUS, vol. 6, p. 136.

[3] Baker, F. C., A New Planorbis from Michigan, NAUTILUS, vol. 25, p. 119.

[4] Robertson, A. D., Mollusca of Georgian Bay, Contributions to Canadian Biology, Supp. 47th Annual Report, Dept. of Marine and Fisheries, Fisheries Branch, Pt. 2, p. 101.

[5] Tryon, Geo., Jr., An Abnormal Specimen of Planorbis bicarinatus. Journ. of Conchology, vol. 2, p. 3.

manner as has the specimen No. 8 of this plate. From the illustration it would be taken for an ordinary dextral shell.

Description.

In the following description only the characters of interest in this discussion are noted: "Shell sinistral, discoidal, more or less rounded; surface shiny, lines of growth oblique; whorls four, rounded above and below, rather subcarinated; gently and regularly expanding; spire flat or on a level with the general plane of the whorls; periphery rounded, aperture lunate, mouth of the aperture dilated to a great extent forming a bell-shaped expansion; last whorl contracts slightly just before the dilation commences; heavy ridge inside aperture beneath constriction forms narrow throat."

The last whorl in many cases shows a tendency to turn slightly upwards, the effect of which is accentuated by the rapidly flaring aperture. In the normal type this is so inconsiderable as to be omitted in most descriptions of the species. Gould[1] and Haldeman,[2] however, mention this feature. The former says: "The whorls enclose each other in a very regular spiral to the last fifth of the outer one, where there is a sudden enlargement and distortion toward the left" (*i. e.* upward). The latter says: "Remarkable for the deflection and dilatation of the last whorl." The figures accompanying the above show the deflection of the lower edge of the aperture to be not more in any case than one-quarter the height of the body whorl. Binney's figure 184, reprinted by Call[3] and others, shows a similar slight deflection. Dr. Baker's[4] plates show no such deflection, and the writer has many specimens in the collections here in which that feature is very inconsiderable. It appears from the fact that so many descriptions are silent on this point,

[1] Gould, Invertebrata of Massachusetts, ed. Binney, p. 493.

[2] Haldeman, Monograph of the Fresh-water Univalve Mollusca of the United States, part 7, p. 9.

[3] Call, R. E., A Descriptive Illustrated Catalogue of the Mollusca of Indiana, p. 410, pl. 8, fig. 12.

[4] Baker, F. C., Mollusca of the Chicago Area, Bull. 3, pt. 2, Natural History Survey, Chicago Academy of Sciences.

that this distortion upwards is not readily observed on normal specimens, and any large degree of upturn of the aperture would seem to be a variation worthy of note.

Variation (Plate X).

In the form from Blue Sea Lake this tendency of the extremity of the last whorl has been greatly accentuated, as a study of Series c in the accompanying plate will show. Fig. c1, a form from Mackay Lake, near Ottawa, shows no deflection at all. The others are all from Blue Sea. In this series there is a gradual elevation of the extremity throughout. In c7 the lower edge of the aperture is more than half-way up the preceding whorl. In c8 the last whorl has been removed completely from the plane of the others, and the aperture is directed upwards at a high angle. The gradation throughout is such that all must be considered as variations within the species, though the end members are quite different. Such variation, however, if followed by the disappearance of intermediate forms would result in new species.

The last shell of the series, No. 8, represents the extreme development of the tendency to deflection from the plane of the shell of the outer whorl. Viewed by itself, it would appear to be merely a rather odd dextral form. On closer inspection it proves to have four and a-half whorls to the point, where there is a small campanulate expansion and where the distortion commences. Therefore, so far, it is normal. The contraction forming the throat of the shell is much less than usual. The last whorl turns upward rapidly and, in a horizontal plane, almost at a right angle to the one preceding as shown in Figs. c8 and b8 respectively. In contrast to the latter, which is sub-carinated above and below, the last whorl is broadly rounded above, and irregularly sub-carinated below. The lines of growth on the body whorl, though inconspicuous, are spaced normally, and those on the small campanulate portion are much finer. However on passing this enlargement, the striae become coarse again, though more oblique and irregular than on the preceding whorl. A short distance from the aperture the shell thickens slightly but there is no pronounced expansion at the extremity of this additional whorl.

In addition to the variation noted above, which is observable throughout the series, certain individuals show others. Normally the spire is on a level with, or slightly below, the plane of the whorls. Shells 1 and 4 conform to this feature fairly well. But in 2 and 3 the second to the last whorl is higher than either those preceding or the body whorl, and in 3 its plane is quite oblique. Shell *g* shows this in a less degree. Series *c* and *d* show this variation well.

Normally the whorls increase slowly and gradually to the beginning of the campanulate expansion. From this nearly all the specimens show various diversions, as shown in series *a*. Shells 4 and 5 approach the type most closely. In 3 and 6 the second to the last whorl is proportionately much the largest. In 3, 4 and 5, the whorls are rounded above except for the last volution, which is sub-carinate. In 2 and 7 the tops of the whorls are quite carinate. From the umbilical aspect as shown in series *b*, these differences are not apparent, the whorls being rounded to sub-carinate below.

The lines of growth are coarser, though not to a large degree, in some specimens than others. Shell 5 is unique in having a series of revolving lines as well. These fade away as they approach the aperture, and are most numerous about the middle of the whorl. Several individuals have also rib-like striae on the campanulate portion of the body whorl, but not elsewhere. Revolving lines on the shell were seen only on this one specimen of those from Blue Sea Lake.

The aperture itself is subject to considerable variation. There is a considerable difference in the degree of flare, and as one would expect from the varying amounts of upturn of the last whorl in the obliquity of the aperture also. Shell 6 and of course 8 are extreme in this regard. In 1 the degree of obliquity from the vertical of the plane of the aperture is 15°; in 6 it is 40°.

One feature, seldom seen in *Planorbis campanulatus*, but which is comparatively common in these specimens, is a rudimentary color banding. Unfortunately, this feature has not shown well in the plate. These colored areas are generally confined to the lower half of the whorl and consist usually of two brown re-

volving lines whose upper and lower boundaries are well defined. Occasionally the two are merged into one broad band. The majority of the specimens in this collection show traces of this ornamentation and in many the lines are quite clearly marked.

Factors Affecting Variation.

As seen from the above paragraph, considerable variation occurs in *Planorbis campanulatus* in the area under discussion. Although, in the literature, references to deviations from type are not common, this form would seem to be a somewhat plastic species reacting to some unusual external condition. In this case the writer attributes these modifications mainly to bottom environment. The habitat of *P. campanulatus* is usually given as *ponds or streams with a muddy bottom, or weedy areas with a muddy or sandy bottom, presumably in well-protected places.* At Blue Sea we have an entirely different set of conditions. This lake is wholly within the Archaean granite and limestone area; its shores, especially toward the north, are precipitous and rocky; and its floor, with the exception of some small muddy bays is composed of bed rock. No streams of any size enter the lake and consequently little sediment is being deposited. The larger of these bays are at the south end, and none of the specimens here discussed were collected there. The shells are often found in from one to three feet of water attached to the rock. Upon these rocks, absolutely devoid of sediment, the waves during a storm beat with great force. Yet, while waves of considerable strength were beating upon the shore, causing small pebbles, which were placed as markers, to be tossed violently to and fro, this gastropod would remain firmly attached by its foot to the rock. This habitat differs vastly from the muddy bottom of rivers or ponds. The animal holds its shell erect. Any increase in obliquity of the aperture causes the shell to be carried more horizontally, and consequently better adapted to resist wave action. In all probability this environment has developed the high degree of obliquity of the specimens from Blue Sea. *Planorbis deflectus* is an example of a form which has a somewhat oblique aperture so that it can lie almost flat, and is found occasionally on exposed rocky shores.

The problem of food may have some influence in the production of these forms. The discrepancies in size of the whorls may be connected with periods of scarcity and abundance of food. With the exception of the small muddy bays above mentioned, the bottom is very free from weeds and algae, the usual food of this gastropod. It is indeed remarkable that the lake can support so large a molluscan fauna as it does. Of plankton there is none. The gastropods are not abundant, but certain of the Unionidae in the bays occur in thousands.

The temperature of the water and range in depth of the gastropods are not sufficiently distinctive to be an important factor in this connection. The average water temperature is not much colder than it would be in the Ottawa valley.

Summary.

To summarize the results of this study it would appear that the specimens of *P. campanulatus* from Blue Sea Lake show considerable variation as follows:

a. Progressively in an increasing deflection upwards of the extremity of the last whorl and aperture from the general plane of the whorls.

b. In degree of elevation and obliquity of the spire.

c. In size and shape of the whorls, which vary from rounded to sharply carinate.

d. In presence in one specimen of well-marked revolving lines.

e. In the flare and obliquity of the aperture.

f. In presence or absence of color-banding.

Of these the first only is regularly progressive, and the latter deviations bear no relation either to it or to each other. To the writer, bottom environment, wave action, and food conditions appear to be the main factors in producing such a series of forms as have been above described. Such conditions are favorable for the development of new varieties and species.

Note.—The writer wishes to gratefully acknowledge the assistance and helpful criticism received from Dr. E. M. Kindle of the Geological Survey of Canada, and from Mr. Frank C. Baker.

Explanation of Plate X.

Variation in Planorbis campanulatus Say.

Series *a*. Apical aspect.

1. From fossil marl beds Mackay Lake, Ottawa.

2–8. From Blue Sea Lake, Quebec.

Series *b*. Umbilical aspect of the above.

Series *c*. Profile view, showing aperture of the above.

Series *d*. Profile view, from side opposite aperture, of the above.

The four views of each specimen are shown in vertical rows, *e. g.*, the four figures at left of plate represent a single shell. All figures natural size.

ON THE LAND SHELLS OF MONROE, CONNECTICUT.

BY ARTHUR JACOT.

Twelve miles north of Bridgeport, Conn. is situated Monroe Center. That part of the town of Monroe lying between the Center and the Housatonic River was searched at several localities for terrestrial mollusca by my wife and me. This region presents five well-marked biological associations in which land shells are common. Of these, the upland swamp (1) was found to be richest in number of species and individuals. A tract which has not been burned over for a great number of years lying west of my father's house and barns (1) we considered to be the best example of the upland swamp association. Water can here be found throughout the year, though much less in summer than at other times. The trees are mainly elm and soft maple with clumps of black ash rising here and there from the water. On each side of the wet area, among the maples and elms are yellow birches, white ashes, and various swamp or wet-land oaks. Lichens and mosses are very numerous, among the latter being sphagnum. The cinnamon fern grows waist-high. The dry wooded hill slopes to the south and southwest of this tract represents the second (2) association, characterized by *Polygyra fraterna* and *Succinea retusa*. The lowland swamp as-

sociation (3) was chiefly studied as typified by the swamp at the head of Cargyles Pond to the east of the above-mentioned localities and at the foot of the hill. This association seems to be characterized by *Succinea ovalis* (*totteniana*). A limestone cave association (4) was merely outlined by the fauna found in a limestone fissure known as Devil's Den, situated on the north side of the Boy's Half-way River (the brook flowing from the above-mentioned artificial pond) a mile below the pond. The limestone is partly leached out, with three entrances, and partially blasted out, making a fissure cavern. Here the larger shells were quite common while the small ones were not noticed. The fifth or fluvio-terrestrial association (5) borders the Housatonic River and is characterized by *Succinea avara*. Although many other localities were examined, all the species found are represented in at least one of the above associations as outlined in the following list.

The method of collecting the smaller species was to gather leaf mould, moss and rubbish (always keeping each collection separate), dry the material in the oven, pass it through a graded series of sieves and carefully sort over each sifting. The method used for finding the larger shells, as well as the smaller, was to carefully scrutinize old wood and stones, especially the under or moist side, bases of stumps and trees, especially the "sawdust" in their cavities, the underside of bark, etc. My wife rendered me the greatest assistance in all of this tedious work.

Notice is called to the absence of *Cochlicopa lubrica* which I have found near Bridgewater, fifteen miles further north. The *Omphalinas* also were not found. No distinctly Canadian fauna species were noticed.

Carychium exiguum (Say). Common at 1, less so at 3.

Polygyra tridentata (Say). Found at 4.

Polygyra albolabris (Say). Occasionally at 1, 3 and 5, common at 2 and 4.

Polygyra thyroides (Say). Found at 4.

Polygyra hirsuta (Say). Found at 2 and 4.

Polygyra fraterna (Say). Found at 2 and 4.

Circinaria concava (Say). Found only at 4.

Vitrea binneyana (Morse). Rare, and only found at 1.

Vitrea indentata (Say). Occasionally at 1, 2, 3 and 4.

Vitrea rhoadsi (Pilsbry). Uncommon, found at 1.

Striatura ferrea (Morse). Rare, and only found at 1.

Striatura milium (Morse). Common at 1, occasionally at 2, 3 and 5.

Euconulus fulvus (Müller). Not satisfactorily distinguished from the next species.

Euconulus chersinus (Say). Common at 1, fairly common at 3 and 5.

Zonitoides hammonis (Ström). Common at 1, 2, 3 and 5.

Zonitoides arborea (Say). Abundant everywhere.

Zonitoides minuscula (Binney). Rarest of the *Zonitidae*, found only at 1.

Zonitoides exigua (Stimpson). Common at 1, fairly common at 3.

Philomycus carolinianus (Bose). Occasional at 2 and 3.

Pallifera dorsalis (Binney). Occasional at 2 and 3.

Pyramidula alternata (Say). Occasional at 2, common at 4.

Pyramidula cronkhitei anthonyi (Pilsbry). Occasional and generally distributed.

Helicodiscus parallelus (Say). Common and generally distributed.

Punctum pygmaeum minutissimum (Lea). Occasional at 1.

Succinea retusa (Lea). Fairly common at 2.

Succinea ovalis (Say). Uncommon at 2 and 3.

Succinea ovalis totteniana (Lea). Common at 3.

Succinea avara (Say). Common at 5.

Strobilops labyrinthica (Say). Common in one spot (about a decaying tree-top) at 1.

Bifidaria contracta (Say). Found at 1.

Bifidaria pentodon (Say). Common at 1 and 3, the commonest Pupillid.

Bifidaria tappaniana (C. B. Adams). Found at 1 and 3.

Vertigo gouldii (Binney). A few specimens from 1 were considered to be this species.

Vertigo bollesiana (Morse). Occasional at 1.

Vertigo ventricosa (Morse). Fairly common at 1.

Vertigo ovata (Say). Fairly common at 1.

Vallonia pulchella (Müller). Rare, at 1 only.

SOME FURTHER COMMENTS UPON THE WORK OF LORENZO EUGENE DANIELS.

BY JUNIUS HENDERSON.

My good friend Ferriss, in the interesting account of the life, character and scientific work of Mr. Daniels, has briefly mentioned the principal items of his work, but there is opportunity for enlargement upon some of the items. Daniels' work is a good text for a sermonette upon the great value of the non-professional and semi-professional in science. His vocation was agriculture, which furnished the means for carrying on his avocation, the collection and study of natural history material. Perhaps there is no branch of natural science that has profited more from the labors of such men than has conchology. There are few strictly professional conchologists or malacologists—that is, men whose living is derived from such work. Therefore, the progress of the science is dependent upon those to whom the work is an avocation, done for the pure love of it, with no thought of financial remuneration. After all, is not that the best reward?

Many of us may not realize the extent and value of Daniels' work so fully as we would had his modesty not kept him so much in the background. His mind was a fountain of information concerning the habits and habitats of snails and methods of caring for material, which information was freely at the disposal of his friends. He was usually content to allow others to do the publishing, or to appear only as joint author. I only recall seven papers bearing his name as the sole author. Probably there are others. In the former account his Minnesota and Montana work was not mentioned. His Minnesota paper covered a field where work was much needed, for the literature of that state was scant compared with that of many states. His Montana work, published by Vanatta, was in a vast territory that has only been scratched in a few places by students of Mollusca. His two seasons in Indiana, prior to 1903, forming the basis for his Catalogue, added 91 to the 184 species and varieties listed for that state by Call, and he has since added

others. It is impossible to estimate, without a great deal of time spent in searching the literature, the forms new to science discovered by him individually or jointly with others, or the extent to which his discoveries have added to the known range of species. Only a small proportion of the species he discovered bear his name. In view of the large amount of work he did in collecting snails of the genus *Oreohelix* in six states, sometimes by himself, sometimes with others, and the number of new forms of *Oreohelix* discovered on those expeditions, it is a shock to realize that no member of that genus is dedicated to him by name.

Another thought has been in my mind for some time. In estimating the work of such an enthusiastic and indefatigable collector, do we place a high enough value upon the benefit to science of the wide distribution of the material, accompanied by reliable data, to other collections and particularly to museums? Material obtained by Mr. Daniels in out-of-the-way places has reached many institutions where it will be studied by hundreds of students for perhaps a century to come, and doubtless will result or assist in adding many facts to our knowledge of natural history, especially of the distribution and variation of species, and straightening out problems of nomenclature and classification, in the years to come.

Mr. Daniels' collections in eleven states have resulted in published reports. I believe he also made one or two trips to Florida, but do not know whether those trips resulted in any publications. Wright, in his description of *Unio danielsi*, from Georgia, stated that Mr. Daniels partly financed some work in that state too.

In addition to the loss to science, those of us who have endured hardships with him in a difficult country, and enjoyed his quiet companionship, looking forward to other trips, feel a deep personal loss in his removal from our midst.

REMARKS UPON THE IDENTITY OF "UNIO FASCIATA," RAFINESQUE.

BY L. S. FRIERSON.

Lampsilis fasciata, Rafinesque.
Unio fasciata, Rafinesque, 1820.
Unio siliquoideus, Barnes, 1823.
Unio inflatus, Barnes, 1823.
Unio distans, Anthony, 1865.
Unio luteolus, Auct. as of Lamarck.

The above wide-spread, common, and well-known Naiad, is seldom given the name which we adopt ("fasciata, Rafinesque") but is all but universally known as "luteolus" as of Lamarck.

The use of the latter as the specific name of the shell is merely the unquestioning acceptation of the dictum of Dr. Lea, who on returning from Europe in 1833, wrote that the "specimen cited by Lamarck" seen by him in the "Garden of Plants" was a "true siliquoideus" of Barnes. Against this application of Lamarck's name for the species, the following reasons seem just.

(1) Lamarck's description does not describe the species in question, but does fairly well describe the Unio cariosus, Say, as evidenced by the unanimous opinion of all writers previous to Lea's pronouncement of 1833 (as well as by some of the more courageous spirits since that event).

(2) Lamarck gives as habitats (he must have seen more than one?) the "Susquehanna and Mohawk Rivers."

The cariosus abounds in these streams, but from neither of them did Lamarck obtain specimens of the species *luteolus*, Auct. (The shell does not live in the Susquehanna; but according to Marshall the species is now an immigrant in the Mohawk through the Erie canal, and this is confirmed as to the Genesee by Ortmann.)

(3) Lea claimed that the specimen seen by him, "cited by Lamarck," was a "true siliquoideus, Barnes;" but his identification was disputed by Férussac, who stated that according to Lamarck's "example" the shell was "cariosus, Say."

The use of "luteolus" as the specific name of the species in question is therefore unwarranted by the description; is absolutely contradicted by the habitats assigned, and rests solely upon the identification of a specimen made by one student, which was at once contradicted by another of equal ability, for it must not be overlooked that in 1832 Lea was by no means the "authority" that he afterwards became.

(In 1829 Lea considered the "Unio cornutus" to be a "protean species" whose "varieties run into the aesopus," and embraced those species which he afterwards knew as "Unio perplexus" and "foliatus." It was still later before he appreciated the specific differences existing between "Unio verrucosus" and "pustulosus;" or between the "Unio plicatus and multiplicatus.")

Notwithstanding that Lea in 1832 conversed with Férussac over the cabinet of the latter concerning their "favorites, the Unios," the latter student (who had specimens of the present species in his cabinet) stuck to his opinion that the "luteolus of Lamarck" was the "carious, Say."

In view of the above the continued use of Lamarck's name for the present species is clearly unwarranted, except by the rather flimsy claim of usage.

Turning now to the name we adopt (fasciata, Rafinesque) we find from its description that Rafinesque had before him an extremely wide-spread species, found practically all over the Ohio drainage, occurring, he writes, "in the rivers Ohio, Alleghany, Muskingum, Kentucky, Green, Salt, etc."

Aside from other characters he states that his species (which though ordinarily small, attains a length of three inches) is inequilateral, elliptical, ventricose and rather thick.

Its epidermis is olive, with brownish rays; a variety has dark rays; another is greenish with blackish rays, alternately wider and narrower; others are copper-colored, with olive rays.

The nacre is bluish, except that in the last variety it is whitish-white. The cardinal tooth is "divaricate."

A handsome species approaching the "ochraceus, Say."

The above characters can be ascribed to no known Naiad from the Ohio drainage except to the species in question.

(A conclusion made doubly certain when we know that even Dr. Lea thought that the "Lamplis fasciola, Rafinesque" might be the species which he (Lea) had afterwards named "Unio multiradiatus.")

It is true that the name "Unio fasciata, Rafinesque," was given by Conrad to a rayed specimen of "ligamentinus, Lamarck" (Monography, Plate I, 36), an error which may yet quite often be found duplicated in cabinets.

But this patent error of Conrad's scarcely militates against the conclusions drawn, since we find in the same work (Monography) figured as one species, specimens of the very diverse shells, Unio fisherianus, Lea, and Unio nasutus, Say (Plate 18).

We find, too, that Conrad figured under the name of "Unio glans, Lea," a specimen of the very different Unio perpurpureus, Lea (Monography, Plate 9 bis).

As bearing upon Conrad's figure referred to, Dr. Lea cogently remarks: "Mr. Conrad thinks the 'crassus, Say,' is the 'fasciata' of Rafinesque. An examination of his description ought to satisfy any one that the 'crassus Say' could not have been under the eye of the author when he made his description of 'fasciata.'"

As bearing upon the identification of "fasciata" with the "pseudo-luteolus"—the "Unio siliquoideus, Barnes," it is a matter of history that Rafinesque often sent to Ferussac specimens of shells from the West, bearing names given by the donor.

Dr. Lea records the fact that specimens of the "siliquoideus, Barnes" were seen by him in the cabinet of Ferussac in 1832, labeled "Unio fasciata, Rafinesque."

All of the available evidence therefore goes to show that the name "fasciata, Rafinesque" must supplant as the specific name of the species, the "luteolus Lamarck," the latter being a synonym of the early "Unio crassus, Say."

ELIZABETH LETSON BRYAN, SC. D.

Elizabeth Letson Bryan died on February 28th at her home in Honolulu, of an organic heart affection after an illness of nearly eight months.

Mrs. Bryan was born April 9, 1874, at Griffin's Mills, Erie Co., New York, the only child of Augustus F. and Nellie Webb Letson. She was a direct descendant from Governor Bradford, first governor of Massachusetts, and was a member of the Mayflower Society of New York. She early became interested in natural history, especially conchology. In 1892 she entered upon her long service in the Buffalo Society of Natural Sciences, of which she became Director in 1899, finally retiring, after a connection of seventeen years, upon her marriage to Professor William Alanson Bryan in 1909. This long period was interrupted by several years given to study in the Academy of Natural Sciences of Philadelphia and the United States National Museum.

In 1899 the Conchological Society of Buffalo was organized by her, and a new period of local enthusiasm for the study of mollusks began. In 1906 Alfred University conferred the honorary degree of Doctor of Science. She was a member of the American Association for the Advancement of Science, the Conchological Society of Great Britain and Ireland, and various other scientific bodies.

Dr. Letson's publications relate chiefly to the mollusks of New York, the more extensive being a Check List of the Mollusca of New York, Bull. 341, N. Y. State Education Department, 1905; Post-Pliocene Fossils of the Niagara River Gravels, published in a Bulletin of the State Museum, 1901; a partial list of the shells found in Erie and Niagara counties and the Niagara frontier, Bull. Buffalo Soc. Nat. Sci., IX, 1909. At the time of her marriage to Professor Bryan, of the College of Hawaii, and her removal to Honolulu, she was working on a monograph of the New York Mollusca.

In Honolulu Mrs. Bryan engaged ardently in the collection

of marine shells. Professor Bryan, who had before been chiefly known for his work on birds, added the mollusks to his other interests, and together, on many an island collecting trip, they amassed the largest collection of Hawaiian marine shells yet brought together.

For several years she had served as librarian of the College of Hawaii, a congenial task bringing many young people under her influence.

In 1917–18 Professor and Mrs. Bryan traveled in California and the East, spending several months at the Academy of Natural Sciences in studying Hawaiian shells. For the same purpose the museums of Cambridge and Washington were also visited.

Mrs. Bryan's gracious personality and sunny outlook, no less than the genuine love of nature which determined the course of her life, made her many warm friends who mourn her untimely death. H. A. P.

Dr. Herbert Huntington Smith, Curator at the Museum of the University of Alabama, was killed by a train on March 22. A notice of his life and work will appear later.

NOTES.

THE INTRODUCTION OF ACANTHINULA HARPA (SAY) AND CIRCINARIA VANCOUVERENSIS (LEA) INTO ST. PAUL ISLAND, ALASKA. —In order that there may be a definite record of the introduction of these two species by man into St. Paul Island, I wish to state that I placed about ten specimens of each of these species behind the laboratories on St. Paul Island, of the Pribiloff Group, in June, 1916. It may also be well to note that I was unable to find any trace of these in 1918. This, of course, does not mean that they may not still be in existence there.— G. DALLAS HANNA.

Henderson Collection of Antillean Land Mollusks.—The National Museum has recently received as a gift from Mr. John B. Henderson, one of the Regents of the Smithsonian Institution and a prominent malacologist, his entire collection of Antillean land mollusks, comprising approximately 400,000 specimens. The bulk of the collection is the result of expeditions to the Antilles made by Mr. Henderson and his assistants for the sole purpose of visiting unexplored or little known regions, or for collecting specimens in the identical localities from which the original types were obtained.

Dr. H. A. Pilsbry has recently been elected a Corresponding Member of the Zoological Society of London.

PUBLICATIONS RECEIVED.

The Pliocene Mollusca of Great Britain. By F. W. Harmer (Palaeontographical Society, Vol. I, parts 3 and 4, pp. 303–483, plates 33–44, 1918 and 1919). This completes Vol. I. Part 1 was published in 1914 and part 2 in 1915, the whole being supplementary to S. V. Wood's Monograph of the Crag Mollusca. It brings the subject up to date and adds much to our knowledge of the distribution of some of the American species in Pliocene times. Aside from some of the species which are circumpolar in distribution, *Sipho pygmaea*, *Bela bicarinata*, a var. of *Eupleura caudata*, *Turritella erosa* and *Nassa trivittata* are also recorded from the pliocene and pleistocene of Great Britain. Part IV contains the title page and index to the volume.—C. W. J.

Post-Glacial Mollusca from the Marls of Central Illinois. By Frank C. Baker (Jour. of Geol., Vol. 26, pp. 659–671, 1918).

On Some Tertiary Fossils from Pribilof Islands. By W. H. Dall (Jour. Washington Acad. Sci., Vol. 9, 1919). The collection of some 47 species made by Mr. G. Dallas Hanna, is of interest as linking up the age of the strata with the beach deposits at Nome which are referred to the late Pliocene.

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